

?	This is a special text character used in the labeling of existing features. It indicates a feature that has an unknown characteristic, potentially based on: lack of description, location accuracy or purpose.		
Abn	abandoned	BV	butterfly valve
Abut	abutment	Byp	bypass
Ac	acres	C Gdrl	cable guardrail
Adj	adjusted	Calc	calculate
Aggr	aggregate	Cd	candela
Ahd	ahead	CIP	cast iron pipe
ARV	air release valve	CB	catch basin
Align	alignment	CRS	cationic rapid setting
Al	alley	C Gd	cattle guard
Alt	alternate	C To C	center to center
Alum	aluminum	Cl or C	centerline
ADA	Americans with Disabilities Act	Cm	centimeter
A	ampere	Ch	chain
&	and	Chnlk	chain-link
Appr	approach	Ch Blk	channel block
Approx	approximate	Ch Ch	channel change
ACP	asbestos cement pipe	Chk	check
Asph	asphalt	Chsld	chiseled
AC	asphalt cement	Cir	circle
Assmd	assumed	Cl	class
@	at	Cl	clay
Atten	attenuation	Cl F	clay fill
ATR	automatic traffic recorder	Cl Hvy	clay heavy
Ave	Avenue	Cl Lm	clay loam
Avg	average	Clnt	clean-out
ADT	average daily traffic	Clr	clear
Az	azimuth	Cl&gr	clearing & grubbing
Bk	back	Co S	coal slack
BF	back face	Comb.	combination
Bs	backsight	Coml	commercial
Balc	balcony	Compr	compression
B Wire	barbed wire	CADD	computer aided drafting & design
Barr	barricade	Conc	concrete
Btry	battery	Cond	conductor
Brg	bearing	Const	construction
BI	beehive inlet	Cont	continuous
Beg	begin	CSB	continuous split barrel sample
BM	bench mark	Contr	contraction
Bkwy	bikeway	Contr	contractor
Bit	bituminous	CP	control point
Blk	block	Coord	coordinate
Bd Ft	board feet	Cor	corner
BH	bore hole	Corr	corrected
BS	both sides	CAES	corrugated aluminum end section
Bot	bottom	CAP	corrugated aluminum pipe
Blvd	Boulevard	CMES	corrugated metal end section
Bndry	boundary	CMP	corrugated metal pipe
BC	brass cap	CPVCP	corrugated poly-vinyl chloride pipe
Brkwy	breakaway	CSES	corrugated steel end section
Br	bridge	CSP	corrugated steel pipe
Bldg	building	CSP	corrugated steel pipe
		C	coulomb
		Co	County
		Crse	course
		C Gr	course gravel
		CS	course sand
		Ct	Court
		Xarm	cross arm
		Xbuck	cross buck
		Xsec	cross sections
		Xing	crossing
		Xrd	Crossroad
		Crn	crown
		CF	cubic feet
		M3	cubic meter
		M3/s	cubic meters per second
		CY	cubic yard
		Cy/mi	cubic yards per mile
		Culv	culvert
		C&G	curb & gutter
		CI	curb inlet
		CR	curb ramp
		CS	curve to spiral
		C	cut
		Dd Ld	dead load
		Defl	deflection
		Defm	deformed
		Deg or D	degree
		DInt	delineate
		DIntr	delineator
		Depr	depression
		Desc	description
		Det	detail
		DWP	detectable warning panel
		Dtr	detour
		Dia	diameter
		Dir	direction
		Dist	distance
		DM	disturbed material
		DB	ditch block
		DG	ditch grade
		Dbl	double
		Dn	down
		Dwg	drawing
		Dr	drive
		Drwy	driveway
		DI	drop inlet
		D	dry density
		Ea	each
		Esmt	easement
		E	East
		EB	Eastbound
		Elast	elastomeric
		EL	electric locker
		E Mtr	electric meter
		Elec	electric/al
		EDM	electronic distance meter
		Elev or EI	elevation
		Ellipt	elliptical
		Emb	embankment
		Emuls	emulsion/emulsified
		ES	end section
		Engr	engineer
		ESS	environmental sensor station
		Eq	equal
		Eq	equation
		Evgr	evergreen
		Exc	excavation
		Exst	existing
		Exp	expansion
		Expy	Expressway
		E	external of curve
		Extru	extruded
		FOS	factor of safety
		F	Fahrenheit
		FS	far side
		F	farad
		Fed	Federal
		FP	feed point
		Ft	feet/foot
		Fn	fence
		Fn P	fence post
		FO	fiber optic
		FB	field book
		FD	field drive
		F	fill
		FAA	fine aggregate angularity
		FS	fine sand
		FH	fire hydrant
		FI	flange
		Flrd	flared
		FES	flared end section
		F Bcn	flashing beacon
		FA	flight auger sample
		FL	flow line
		Ftg	footing
		FM	force main
		Fs	foresight
		Fnd	found
		Fdn	foundation
		Frac	fractional
		Frwy	freeway
		Fr	front
		FF	front face
		F Disp	fuel dispenser

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
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NDDOT ABBREVIATIONS

D-101-2

FFP	fuel filler pipes	IPn	Iron Pin	MC	medium curing	Ped	pedestal
FLS	fuel leak sensor	IP	Iron Pipe	M	mega	Ped	pedestrian
Furn	furnish/ed	Jt	joint	Mer	meridian	PPP	pedestrian pushbutton post
Gal	gallon	J	joule	M	meter	Pen.	penetration
Galv	galvanized	Jct	junction	M/s	meters per second	Perf	perforated
Gar	garage	K	kelvin	M	mid ordinate of curve	Per.	perimeter
Gs L	gas line	Kn	kilo newton	Mi	mile	PL	pipeline
G Reg	gas line regulator	Kpa	kilo pascal	MM	mile marker	PI	place
GMV	gas main valve	Kg	kilogram	MP	mile post	P&P	plan & profile
G Mtr	gas meter	Kg/m3	kilogram per cubic meter	MI	milliliter	PL	plastic limit
GSV	gas service valve	Km	kilometer	Mm	millimeter	PI	plate
GVP	gas vent pipe	K	Kip(s)	Mm/hr	millimeters per hour	Pt	point
GV	gate valve	LS	Land Surveyor (licensed)	Min	minimum	PCC	point of compound curve
Ga	gauge	LSIT	Land Surveyor In Training	Misc	miscellaneous	PC	point of curve
Geod	geodetic	Ln	lane	Mon	monument	PI	point of intersection
GIS	Geographical Information System	Lg	large	Mnd	mound	PRC	point of reverse curvature
G	giga	Lat	latitude	Mtbl	mountable	PT	point of tangent
GPS	Global Positioning System	Lt	left	Mtd	mounted	POC	point on curve
Gov	government	L	length of curve	Mtg	mounting	POT	point on tangent
Grd	graded/grade	Lens	lenses	Mk	muck	PE	polyethylene
Gr	gravel	Lvl	level	Mun	municipal	PVC	polyvinyl chloride
Grnd	ground	LB	level book	N	nano	PCC	Portland Cement concrete
GWM	ground water monitor	Lvlng	leveling	NGS	National Geodetic Survey	Lb or #	pounds
Gdrl	guardrail	Lht	light	NS	near side	PP	power pole
Gtr	gutter	LP	light pole	Neop	neoprene	Preempt	preemption
H Plg	H piling	Ltg	lighting	Ntwk	network	Prefab	prefabricated
Hdwl	headwall	Lig Co	lignite coal	N	newton	Prfmd	preformed
Ha	hectare	Lig Sl	lignite slack	N	North	Prep	preperation
Ht	height	LF	linear foot	NE	North East	Press.	pressure
HI	height of instrument	Liq	liquid	NW	North West	PRV	pressure relief valve
Hel	helical	LL	liquid limit	NB	Northbound	Prestr	prestressed
H	henry	L	litre	No. or #	number	Pvt	private
Hz	hertz	Lm	loam	Obsc	obscure(d)	PD	private drive
HDPE	high density polyethylene	Loc	location	Obsn	observation	Prod.	production/produce
HM	high mast	LC	long chord	Ocpd	occupied	Prog	programmed
HP	high pressure	Long.	longitude	Ocpy	occupy	Prop.	property
HPS	high pressure sodium	Lp	loop	Off Loc	office location	Prop Ln	property line
Hwy	highway	LD	loop detector	O/s	offset	Ppsd	proposed
Hor	horizontal	Lm	lumen	OC	on center	PB	pull box
HBP	hot bituminous pavement	Lum	luminaire	C	one dimensional consolidation		
HMA	hot mix asphalt	L Sum	lump sum	OC	organic content		
Hr	hour(s)	Lx	lux	Orig	original		
Hyd	hydrant	ML	main line	O To O	out to out		
Ph	hydrogen ion content	M Hr	man hour	OD	outside diameter		
Id	identification	MH	manhole	OH	overhead		
In or "	inch	Mkd	marked	PMT	pad mounted transformer		
Incl	inclinometer tube	Mkr	marker	Pg	pages		
IMH	inlet manhole	Mkg	marking	Pntd	painted		
ID	inside diameter	MA	mast arm	Pr	pair		
Inst	instrument	Matl	material	Pnl	panel		
Intchg	interchange	Max	maximum	Pk	park		
Intmdt	intermediate	MC	meander corner	PK	Parker-Kalon nail		
Intscn	intersection	Meas	measure	Pa	pascal		
Inv	invert	Mdn	median	PSD	passing sight distance		
IM	iron monument	MD	median drain	Pvmt	pavement		

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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NDDOT ABBREVIATIONS

D-101-3

Qty	quantity	SN	sign number	Tan	tangent	Wb	weber
Qtr	quarter	Sig	signal	T	tangent (semi)	WIM	weigh in motion
Rad or R	radius	Si Cl	silt clay	TS	tangent to spiral	W	west
RR	railroad	Si Cl Lm	silty clay loam	Tel	telephone	WB	westbound
Rlwy	railway	Si Lm	silty loam	Tel B	Telephone Booth	Wrng	wiring
Rsd	raised	Sgl	single	Tel P	telephone pole	W/	with
RTP	random traverse point	SC	slow curing	Tv	television	W/o	without
Rge or R	range	SS	slow setting	Temp	temperature	WC	witness corner
RC	rapid curing	Sm	small	Temp	temporary	WGS	world geodetic system
Rec	record	S	South	TBM	temporary bench mark	Z	zenith
Rcy	recycle	SE	South East	T	tesla		
RAP	recycled asphalt pavement	SW	South West	T	thinwall tube sample		
RPCC	recycled portland cement concrete	SB	Southbound	T/mi	tons per mile		
Ref	reference	Sp	spaces	Ts	topsoil		
R Mkr	reference marker	Spcl	special	Tw or T	township		
RM	reference monument	SA	special assembly	Traf	traffic		
Refl	reflectorized	SP	special provisions	TSCB	traffic signal control box		
RCB	reinforced concrete box	G	specific gravity	Tr	trail		
RCES	reinforced concrete end section	Spk	spike	Transf	transformer		
RCP	reinforced concrete pipe	SC	spiral to curve	TB	transit book		
RCPS	reinforced concrete pipe sewer	ST	spiral to tangent	Trans	transition		
Reinf	reinforcement	SB	split barrel sample	TT	transmission tower		
Res	reservation	SH	sprinkler head	Trans	transverse		
Ret	retaining	SV	sprinkler valve	Trav	traverse		
Rev	reverse	Sq	square	TP	traverse point		
Rt	right	SF	square feet	Trtd	treated		
R/W	right of way	Km2	square kilometer	Trmt	treatment		
Riv	river	M2	square meter	Qc	triaxial compression		
Rd	road	SY	square yard	TERO	tribal employment rights ordinance		
Rdbd	road bed	Stk	stake	Tpl	triple		
Rdwy	roadway	Std	standard	TP	turning point		
RWIS	roadway weather information system	N	standard penetration test	Typ	typical		
Rk	rock	Std Specs	standard specifications	Qu	unconfined compressive strength		
Rt	route	Sta	station	Ugrnd	underground		
Salv	salvage(d)	Sta Yd	station yards	USC&G	US Coast & Geodetic Survey		
Sd	sand	Stm L	steam line	USGS	US Geologic Survey		
Sdy Cl	sandy clay	SEC	steel encased concrete	Util	utility		
Sdy Cl Lm	sandy clay loam	SMA	stone matrix asphalt	VG	valley gutter		
Sdy Fl	sandy fill	SSD	stopping sight distance	Vap	vapor		
Sdy Lm	sandy loam	SD	storm drain	Vert	vertical		
San	sanitary sewer line	St	street	VC	vertical curve		
Sc	scoria	SPP	structural plate pipe	VCP	vitrified clay pipe		
Sec	seconds	SPPA	structural plate pipe arch	V	volt		
Sec	section	Str	structure	Vol	volume		
SL	section line	Subd	subdivision	Wkwy	walkway		
Sep	separation	Sub	subgrade	W	water content		
Seq	sequence	Sub Prep	subgrade preperation	WGV	water gate valve		
Serv	service	Ss	subsoil	WL	water line		
Sh	shale	SE	superelevation	WM	water main		
Sht	sheet	SS	supplement specification	WMV	water main valve		
Shtng	sheeting	Supp	supplemental	W Mtr	water meter		
Shldr	shoulder	Surf	surfacing	WSV	water service valve		
Sw	sidewalk	Surv	survey	WW	water well		
S	siemens	Sym	symmetrical	W	watt		
SD	sight distance	SI	systems international	Wrng	wearing		

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NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

702COM	702 Communications	GT PLNS NAT GAS	Great Plains Natural Gas Company	RED RIV TEL	Red River Rural Telephone
ACCENT	Accent Communications	HALS TEL	Halstad Telephone Company	RESVTN TEL	Reservation Telephone
AGASSIZ WU	Agassiz Water Users Incorporated	IDEA1	Idea1	ROBRTS TEL	Roberts Company Telephone
AGC	Associated General Contractors of America	INT-COMM TEL	Inter-Community Telephone Company	R-RIDER ELEC	Roughrider Electric Coop
All PI	Alliance Pipeline	KANEB PL	Kaneb Pipeline Company	RRVW	Red River Valley & Western Railroad
ALL SEAS WU	All Seasons Water Users Association	KEM ELEC	Kem Electric Cooperative Incorporated	RSR ELEC	R.S.R. Electric Cooperative
AMOCO PI	Amoco Pipeline Company	KOCH GATH SYS	Koch Gathering Systems Incorporated	S E W U	South East Water Users Incorporated
AMRDA HESS	Amerada Hess Corporation	LKHD PL	Lakehead Pipeline Company	SCOTT CABLE	Scott Cable Television Dickinson
AT&T	AT&T Corporation	LNGDN RWU	Langdon Rural Water Users Incorporated	SHERDN ELEC	Sheridan Electric Cooperative
B PAW	Bear Paw Energy Incorporated	LWR YELL R ELEC	Lower Yellowstone Rural Electric	SHEYN VLY ELEC	Sheyenne Valley Electric Cooperative
BAKER ELEC	Baker Electric	MCKNZ CON	McKenzie Consolidated Telcom	SKYTECH	Skyland Technologies Incorporated
BASIN ELEC	Basin Electric Cooperative Incorporated	MCKNZ ELEC	McKenzie Electric Cooperative	SLOPE ELEC	Slope Electric Cooperative Incorporated
BEK TEL	Bek Communications Cooperative	MCKNZ WRD	McKenzie County Water Resource District	SOURIS RIV TELCOM	Souris River Telecommunications
BELLE PL	Belle Fourche Pipeline Company	MCLEOD	McLeod USA	ST WAT COMM	State Water Commission
BLM	Bureau of Land Management	MCLN ELEC	McLean Electric Cooperative	STATE LN WATER	State Line Water Cooperative
BNSF	Burlington Northern Santa Fe Railway	MCLN-SHRDN R WAT	McLean-Sheridan Rural Water	STER ENG	Sterling Energy
BOEING	Boeing	MDU	Montana-dakota Utilities	STUT RWU	Stutsman Rural Water Users
BRNS RWD	Barnes Rural Water District	MID-CONT CABLE	Mid-Continent Cable	SW PL PRJ	Southwest Pipeline Project
BURK-DIV ELEC	Burke-Divide Electric Cooperative	MIDSTATE TEL	Midstate Telephone Company	T M C	Turtle Mountain Communications
BURL WU	Burleigh Water Users	MINOT CABLE	Minot Cable Television	TCI	TCI of North Dakota
Cable One	Cable One	MINOT TEL	Minot Telephone Company	TESORO HGH PLNS PL	Tesoro High Plains Pipeline
CABLE SERV	Cable Services	MISS W W S	Missouri West Water System	TRI-CNTY WU	Tri-County Water Users Incorporated
CAP ELEC	Capital Electric Cooperative Incorporat	MNKOTA PWR	Minnkota Power	TRL CO RWU	Traill County Rural Water Users
CASS CO ELEC	Cass County Electric Cooperative	MOR-GRAN-SOU ELEC	Mor-gran-sou Electric Cooperative	UNTD TEL	United Telephone
CASS RWU	Cass Rural Water Users Incorporated	MOUNT-WILLI ELEC	Mountrail-williams Electric Cooperative	UPPR SOUR WUA	Upper Souris Water Users Association
CAV ELEC	Cavalier Rural Electric Cooperative	MRE LBTY TEL	Moore & Liberty Telephone	US SPRINT	U.S. Sprint
CBLCOM	Cablecom Of Fargo	MUNICIPAL	City Water And Sewer	USAF MSL CABLE	U.S.A.F. Missile Cable
CENEX PL	Cenex Pipeline	MUNICIPAL	City Of '.....'	USFWS	US Fish and Wildlife Service
CENT PL WATER DIST	Central Pipe Line Water District	N CENT ELEC	North Central Electric Cooperative	USW COMM	U.S. West Communications
CENT PWR ELEC	Central Power Electric Cooperative	N VALL W DIST	North Valley Water District	VRNDRY ELEC	Verendrye Electric Cooperative
COE	Corps of Engineers	ND PKS & REC	North Dakota Parks And Recreation	W RIV TEL	West River Telephone Incorporated
CONS TEL	Consolidated Telephone	ND TEL	North Dakota Telephone Company	WEB	W. E. B. Water Development Association
CONT RES	Continental Resource Inc	NDDOT	North Dakota Department of Transportation	WILLI RWA	Williams Rural Water Association
CPR	Canadian Pacific Railway	NDSU SOIL SCI DEPT	NDSU Soil Science Department	WILSTN BAS PL	Williston Basin Interstate Pipeline Company
D O E	Department Of Energy	NEMONT TEL	Nemont Telephone	WLSH RWD	Walsh Water Rural Water District
DAK CARR	Dakota Carrier Network	NODAK R ELEC	Nodak Rural Electric Cooperative	WOLVRTN TEL	Wolverton Telephone
DAK CENT TEL	Dakota Central Telephone	NOON FRMS TEL	Noonan Farmers Telephone Company	XLENER	Xcel Energy
DAK RWD	Dakota Rural Water District	NPR	Northern Plains Railroad	YSVR	Yellowstone Valley Railroad
DGC	Dakota Gasification Company	NSP	Northern States Power		
DICKEY R NET	Dickey Rural Networks	NTH PRAIR RW	Northern Prairie Rural Water Association		
DICKEY RWU	Dickey Rural Water Users Association	NTHN BRDR PL	Northern Border Pipeline		
DICKEY TEL	Dickey Telephone	NTHN PLNS ELEC	Northern Plains Electric Cooperative Incorporated		
DNRR	Dakota Northern Railroad	NTHWSTRN REF	Northwestern Refinery Company		
DOME PL	Dome Pipeline Company	NW COMM	Northwest Communication Cooperation		
DVELEC	Dakota Valley Electric Cooperative	ONEOK	Oneok gas		
DVMW	Dakota, Missouri Valley & Western	OSHA	Occupational Safety and Health Administration		
ENBRDG	Enbridge Pipelines Incorporated	OTTR TL PWR	Otter Tail Power Company		
ENVENTIS	Enventis Telephone	P L E M	Prairielands Energy Marketing		
FALK MNG	Falkirk Mining Company	POLAR COM	Polar Communications		
FHWA	Federal Highway Administration	PVT ELEC	Private Electric		
G FKS-TRL WD	Grand Forks-trail Water District	QWEST	Qwest Communications		
GETTY TRD & TRAN	Getty Trading & Transportation	R&T W SUPPLY	R & T Water Supply Association		
GLDN W ELEC	Golden West Electric Cooperative	RAMSEY R SEW	Ramsey Rural Sewer Association		
GRGS CO TEL	Griggs County Telephone	RAMSEY RW	Ramsey Rural Water Association		
		RAMSEY UTIL	Ramsey County Rural Utilities		

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Line Styles

Existing Topography

	Existing Ground Void
	Existing Cemetary Boundary
	Existing Box Culvert Bridge
	Existing Concrete Surface
	Existing Drainage Structure
	Existing Gravel Surface
	Existing Riprap
	Existing Dirt Surface
	Existing Asphalt Surface
	Existing Tie Point Line
	Existing Railroad Centerline
	Existing Guardrail Cable
	Existing Guardrail Metal
	Existing Edge of Water
	Existing Fence
	Existing Railroad
	Existing Field Line
	Exst Flow
	Existing Curb
	Existing Valley Gutter
	Existing Driveway Gutter
	Existing Curb and Gutter
	Existing Mountable Curb and Gutter

	Existing 3-Cable w Posts
	Site Boundary
	Existing Berm, Dike, Pit, or Earth Dam
	Existing Ditch Block
	Existing Tree Boundary
	Existing Brush or Shrub Boundary
	Existing Retaining Wall
	Existing Planter or Wall
	Existing W-Beam Guardrail with Posts
	Existing Railroad Switch
	Gravel Pit - Borrow Area
	Existing Wet Area-Vegetation Break

Proposed Topography

	3-Cable w Posts
	Flow
	Fence
	Remove Line
	Wall
	Retaining Wall (Plan View)
	W-Beam w Posts

Existing Utilities

	Existing Electrical
	Existing Fiber Optic Line
	Existing TV Fiber Optic
	Existing Gas Pipe
	Existing Overhead Utility Line
	Existing Power
	Existing Fuel Pipeline
	Existing Undefined Above Ground Pipe Line
	Existing Sanitary Sewer
	Existing Sanitary Force Main
	Existing Storm Drain
	Existing Storm Drain Force Main
	Existing Culvert
	Existing Telephone Line
	Existing TV Line
	Existing Water or Steam Line
	Existing Under Drain
	Existing Slotted Drain
	Existing Conduit
	Existing Conductor
	Existing Down Guy Wire Down Guy
	Existing Underground Vault or Lift Station

Proposed Utilities

	24 Inch Pipe
	Reinforced Concrete Pipe
	Under Drain
	Edge Drain

Traffic Utilities

	Conductor
	Fiber Optic
	Existing Loop Detector
	Existing Double Micro Loop Detector
	Micro Loop Detector Double
	Existing Micro Loop Detector
	Micro Loop Detector
	Signal Head with Mast Arm
	Existing Signal Head with Mast Arm

Sign Structures

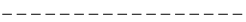
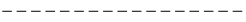




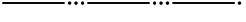






	Existing Overhead Sign Structure
	Existing Overhead Sign Structure Cantilever
	Overhead Sign Structure Cantilever

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
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09-23-16	Added and Revised Items, Organized by Functional Groups

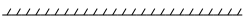





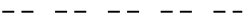


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Line Styles

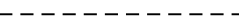
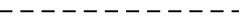
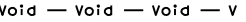
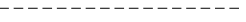




Right Of Way

	Easement
	Existing Easement
	Right of Way
	Existing Right of Way
	Existing Right of Way Railroad
	Existing Right of Way Not State Owned
	Existing Government Lot Line
	Existing Adjacent Block Lines
	Existing Adjacent Lot Lines
	Existing Adjacent Property Line
	Existing Adjacent Subdivision Lines
	Sight Distance Triangle Line
	Dimension Leader







Boundary Control

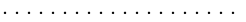

	Existing City Corporate Limits or Reservation Boundary
	Existing State or International Line
	Existing Township
	Existing County
	Existing Section Line
	Existing Quarter Section Line
	Existing Sixteenth Section Line
	Existing Centerline
	Tangent Line

Cross Sections and Typicals



	Existing Ground
	Existing Topsoil (Cross Section View)
	Existing Ground Void (Not Surveyed)
	Existing Concrete
	Existing Aggregate (Cross Section View)
	Existing Curb and Gutter (Cross Section View)
	Existing Asphalt (Cross Section View)
	Existing Reinforcement Rebar

Geotechnical

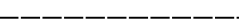
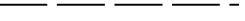
	D	Geotextile Fabric Type D
	Geo	Geogrid
	R	Geotextile Fabric Type R
	R	Geotextile Fabric Type R1
	RR	Geotextile Fabric Type RR
	S	Geotextile Fabric Type S

	Subgrade Reinforcement
	Failure Line


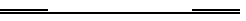

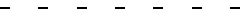


Countours

	Depression Contours
	Supplemental Contour

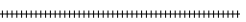



Profile

	Subgrade, Subcut or Ditch Grade
	Topsoil Profile










Striping

	Centerline Pavement Marking
	Barrier with Centerline Pavement Marking
	Barrier Pavement Marking
	Stripe 4 IN Dotted Extension White
	Stripe 8 IN Dotted Extension White
	Stripe 8 IN Lane Drop

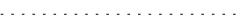





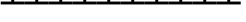
Pavement Joints

	Doweled Joint
	Tie Bar 30 Inch 4 Foot Center to Center
	Tie Bar 18 Inch 3 Foot Center to Center
	Tie Bar at Random Spacing





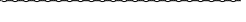
Bridge Details

	Hidden Object
	Small Hidden Object
	Large Hidden Object
	Phantom Object
	Centerline Main
	Centerline
	Existing Ground (Details)
	Existing Conditions
	Sheet Piling

Erosion Control

	Limits of Const Transition Line
	Bale Check
	Rock Check
	S Floating Silt Curtain
	SF Silt Fence
	Excavation Limits
	Fiber Rolls

Environmental

	Wetland Mitigation
	Existing Wetland Easement USFWS
	Existing Wetland Jurisdictional
	Existing Wetland
	Tree Row

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
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DATE	CHANGE
09-23-16	Added and Revised Items, Organized by Functional Groups

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


























































































Symbols

	North Arrow (Half Scale)		Attenuation Device		Existing Railroad Battery Box		Existing Delineator Type E
	Truck Mounted Attenuator		Diamond Grade Delineator Type A		Existing Bush or Shrub		Existing EFB Misc
	Type I Barricade		Diamond Grade Delineator Type B		Existing Gas Cap or Stub		Existing Flashing Beacon
	Type II Barricade		Diamond Grade Delineator Type C		Existing Sanitary Cap or Stub		Existing Pipe Mounted Flasher
	Type III Barricade		Diamond Grade Delineator Type D		Existing Storm Drain Cap or Stub		Existing Pad Mounted Feed Point
	Catch Basin		Diamond Grade Delineator Type E		Existing Water Cap or Stub		Existing Pipe Mounted Feed Point with Pad
	Caim or Stone Circle		Flexible Delineator		Existing Sanitary Cleanout		Existing Pole Mounted Feed Point
	Video Detection Camera		Flexible Delineator Type A		Existing Concrete Foundation		Existing Railroad Frog
	Storm Drain Cap or Stub		Flexible Delineator Type B		Existing Traffic Signal Controller		Existing Snow Gate 18
	Corrugated Metal End Section 18 Inch		Flexible Delineator Type C		Existing Pad Mounted Signal Controller		Existing Snow Gate 28
	Corrugated Metal End Section 24 Inch		Flexible Delineator Type D		Existing Sixteenth Section Corner		Existing Snow Gate 40
	Corrugated Metal End Section 30 Inch		Flexible Delineator Type E		Existing Quarter Section Corner		Existing Headwall
	Corrugated Metal End Section 36 Inch		Delineator Type A		Existing Section Corner		Existing Pedestrian Head with Number
	Corrugated Metal End Section 42 Inch		Delineator Type A Reset		Existing Railroad Crossbuck		Existing Signal Head
	Corrugated Metal End Section 48 Inch		Delineator Type B		Existing Satellite Dish		Existing Sprinkler Head
	Concrete Foundation		Delineator Type B Reset		Existing Fuel Dispensers		Existing Fire Hydrant
	Ground Connection Conductor		Delineator Type C		Existing Flexible Delineator Type A		Existing Catch Basin Drop Inlet
	Neutral Connection Conductor		Delineator Type D		Existing Flexible Delineator Type B		Existing Curb Inlet
	Phase 1 Connection Conductor		Delineator Type E		Existing Flexible Delineator Type C		Existing Manhole Inlet
	Phase 2 Connection Conductor		Delineator Drums		Existing Flexible Delineator Type D		Existing Junction Box
	Traffic Cone		Spot Elevation		Existing Flexible Delineator Type E		
	Signal Controller		Existing Access Control Arrow		Existing Delineator Type A		
	Pad Mounted Signal Controller		Existing Artifact		Existing Delineator Type B		
	Alignment Data Point		Existing Flashing Beacon		Existing Delineator Type C		
	Emergency Vehicle Detector		Existing Benchmark		Existing Delineator Type D		

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Symbols

D-101-31

	Existing Light Standard		Existing Manhole with Valve Water		Existing Telephone Pole		Existing Undefined Manhole
	Existing High Mast Light Standard 10 Luminaire		Existing Water Manhole		Existing Wood Pole		Existing Undefined Pull Box
	Existing High Mast Light Standard 3 Luminaire		Existing Mile Post Type A		Existing Post		Existing Undefined Pedestal
	Existing High Mast Light Standard 4 Luminaire		Existing Mile Post Type B		Existing Pedestrian Push Button Post		Existing Undefined Valve
	Existing High Mast Light Standard 5 Luminaire		Existing Mile Post Type C		Existing Control Point CP		Existing Undefined Pipe Vent
	Existing High Mast Light Standard 6 Luminaire		Existing Reference Marker		Existing Control Point GPS-RTK		Existing Gas Valve
	Existing High Mast Light Standard 7 Luminaire		Existing RW Marker		Existing Control Point TRI		Existing Water Valve
	Existing High Mast Light Standard 8 Luminaire		Existing Utility Marker		Existing Reference Marker Point NGS		Existing Fuel Pipe Vent
	Existing High Mast Light Standard 9 Luminaire		Iron Monument Found		Existing Pull Box		Existing Gas Pipe Vent
	Existing Overhead Sign Structure Load Center		Iron Pin R/W Monument		Existing Intelligent Transportation Pull Box		Existing Sanitary Pipe Vent
	Existing Luminaire		Existing Object Marker Type I		Existing Water Pump		Existing Storm Drain Pipe Vent
	Existing Light Standard Luminaire		Existing Object Marker Type II		Existing Slotted Reinforced Concrete Pipe		Existing Water Pipe Vent
	Existing Federal Mailbox		Existing Object Marker Type III		Existing RR Profile Spot		Existing Weather Station
	Existing Private Mailbox		Existing Electrical Pedestal		Existing Fuel Leak Sensors		Existing Ground Water Well Bore Hole
	Existing Meander Section Corner		Existing Telephone Pedestal		Existing Highway Sign		Existing Windmill or Tower
	Existing Meter		Existing Fiber Optic Telephone Pedestal		Existing Miscellaneous Spot		Existing Witness Corner
	Existing Electrical Manhole		Existing TV Pedestal		Existing Lighting Standard Pole		Flashing Beacon
	Existing Gas Manhole		Existing Fiber Optic TV Pedestal		Existing Traffic Signal Standard		Flagger
	Existing Sanitary Manhole		Existing Fuel Filler Pipes		Existing Transformer		Pipe Mounted Flasher
	Existing Sanitary Force Main Manhole		Existing Traverse PI Aerial Panel		Existing Large Evergreen Tree		Sanitary Force Main with Valve
	Existing Sanitary Manhole with Valve		Existing Pole		Existing Small Evergreen Tree		
	Existing Storm Drain Manhole		Existing Power Pole		Existing Large Tree		
	Existing Force Main Storm Drain Manhole		Existing Power Pole with Transformer		Existing Small Tree		
	Existing Force Main Storm Drain Manhole with Valve				Existing Tree Trunk		
	Existing Telephone Manhole				Existing Pad Mounted Traffic Signal Control Box		

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Symbols



Pad Mounted Feed Point



Pipe Mounted Feed Point with Pad



Pole Mounted Feed Point



Headwall



Double Headwall with Vegetation Barrier



Single Headwall with Vegetation Barrier



Pole Mounted Head



Sprinkler Head



Fire Hydrant



Inlet Type 1



Inlet Type 2



Double Inlet Type 2



Inlet Grate Type 2



Junction Box



High Mast Light Standard 10 Luminaire



High Mast Light Standard 3 Luminaire



High Mast Light Standard 4 Luminaire



High Mast Light Standard 5 Luminaire



High Mast Light Standard 6 Luminaire



High Mast Light Standard 7 Luminaire



High Mast Light Standard 8 Luminaire



High Mast Light Standard 9 Luminaire



Relocate Light Standard



Overhead Sign Structure Load Center



Light Standard 100 Watt High Pressure Sodium Vapor Luminaire



Light Standard 1000 Watt High Pressure Sodium Vapor Luminaire



Light Standard 150 Watt High Pressure Sodium Vapor Luminaire



Light Standard 175 Watt High Pressure Sodium Vapor Luminaire



Light Standard 200 Watt High Pressure Sodium Vapor Luminaire



Light Standard 250 Watt High Pressure Sodium Vapor Luminaire



Light Standard 310 Watt High Pressure Sodium Vapor Luminaire



Light Standard 35 Watt High Pressure Sodium Vapor Luminaire



Light Standard 400 Watt High Pressure Sodium Vapor Luminaire



Light Standard 50 Watt High Pressure Sodium Vapor Luminaire



Light Standard 70 Watt High Pressure Sodium Vapor Luminaire



Light Standard 700 Watt High Pressure Sodium Vapor Luminaire



Manhole



Manhole 48 Inch



Sanitary Force Main Manhole



Sanitary Sewer Manhole



Storm Drain Manhole



Storm Drain Manhole with Inlet



Reset Mile Post



Mile Post Type A



Mile Post Type B



Mile Post Type C



Right of Way Marker



Tubular Marker



Alignment Monument



Iron Pin Reference Monument



Object Marker Type I



Object Marker Type II



Object Marker Type III



Caution Mode Arrow Panel



Back to Back Vertical Panel Sign



Double Direction Arrow Panel



Left Directional Arrow Panel



Right Directional Arrow Panel



Sequencing Arrow Panel



Truck Mounted Arrow Panel



Power Pole



Wood Pole



Pedestrian Push Button Post



Property Corner



Pull Box



Intelligent Transportation Pull Box



Sanitary Pump



Storm Drain Pump



Reinforced Pavement



Reinforced Concrete End Section 15 Inch



Reinforced Concrete End Section 18 Inch



Reinforced Concrete End Section 24 Inch



Reinforced Concrete End Section 30 Inch



Reinforced Concrete End Section 36 Inch



Reinforced Concrete End Section 42 Inch



Reinforced Concrete End Section 48 Inch



Reinforced Concrete End Section 54 Inch



Reset Right of Way Marker



Reset USGS Marker



Right of Way Markers



Riser 30 Inch



Continuous Split Barrel Sample



Flight Auger Sample



Split Barrel Sample



Thinwall Tube Sample



Highway Sign



SNOW GATE 18 FT



SNOW GATE 28 FT



SNOW GATE 40 FT



Standard Penetration Test



Transformer



Inclinometer Tube



Underdrain Cleanout



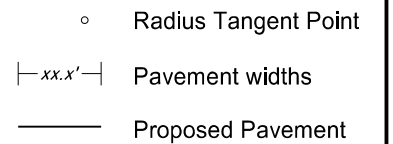
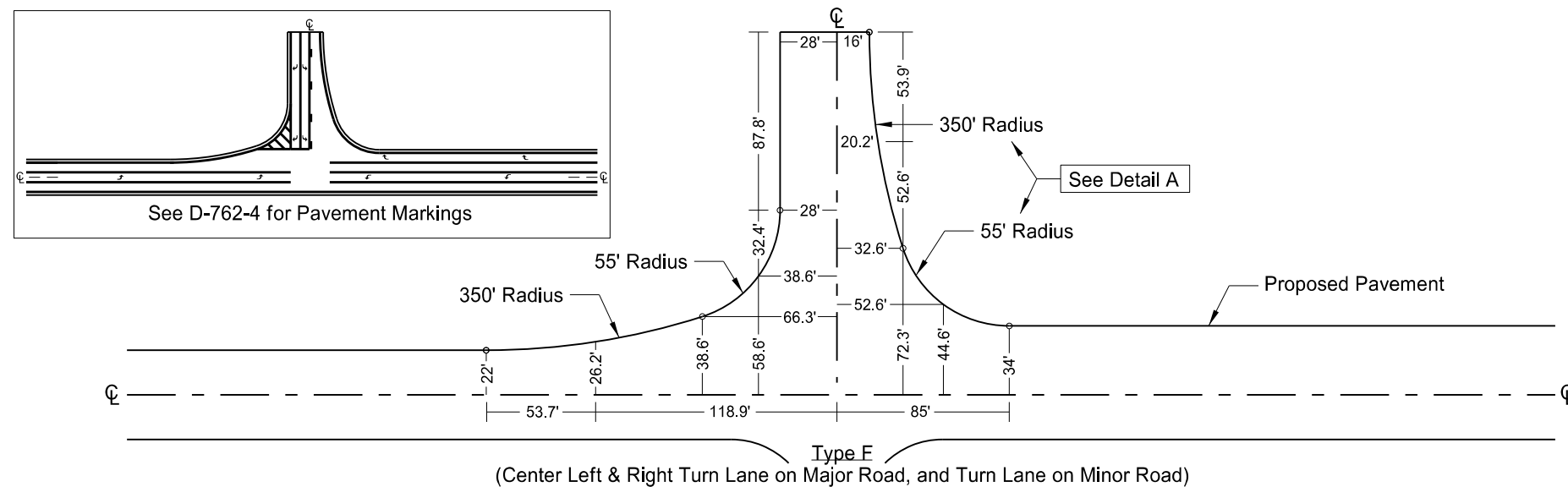
Excavation Unit



Water Valve

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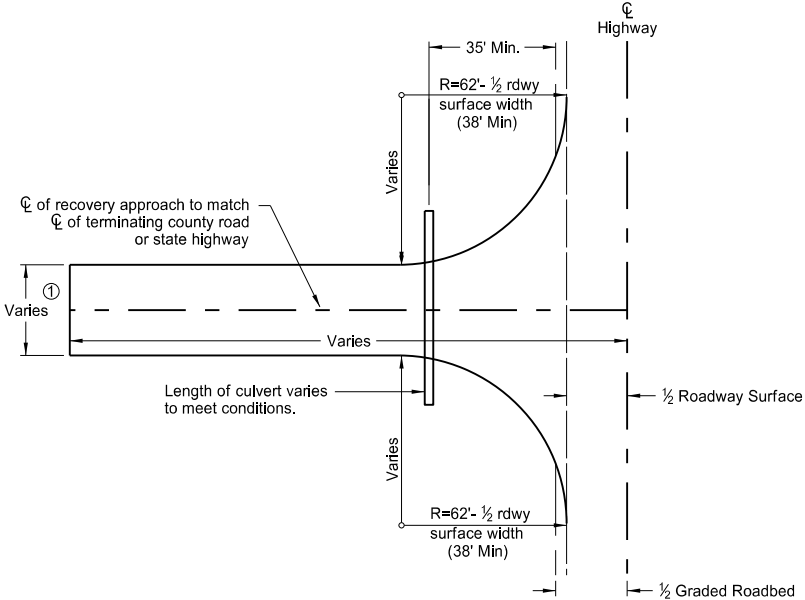


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3-29-16	
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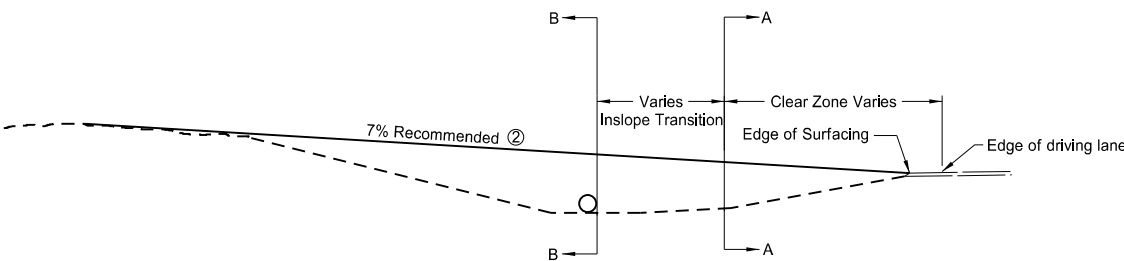
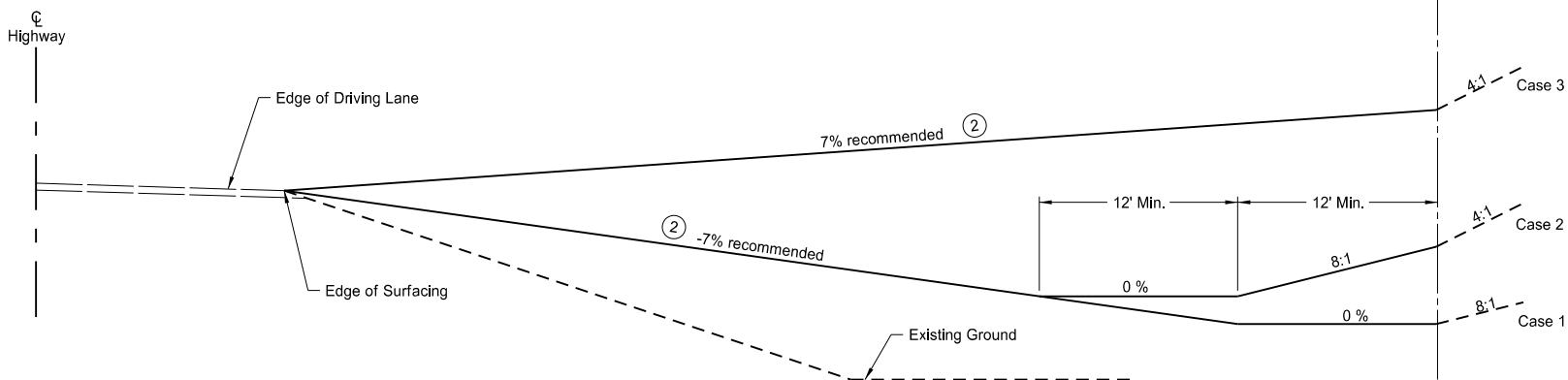
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RECOVERY APPROACHES AT T-INTERSECTIONS

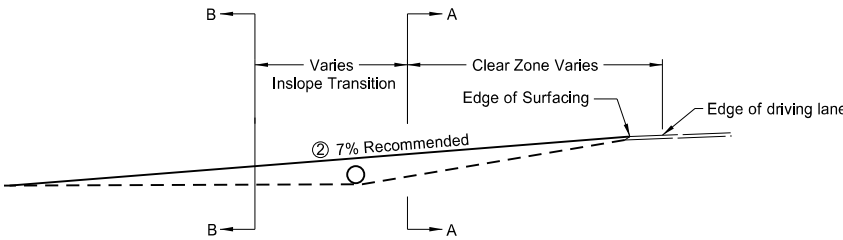
D-203-7



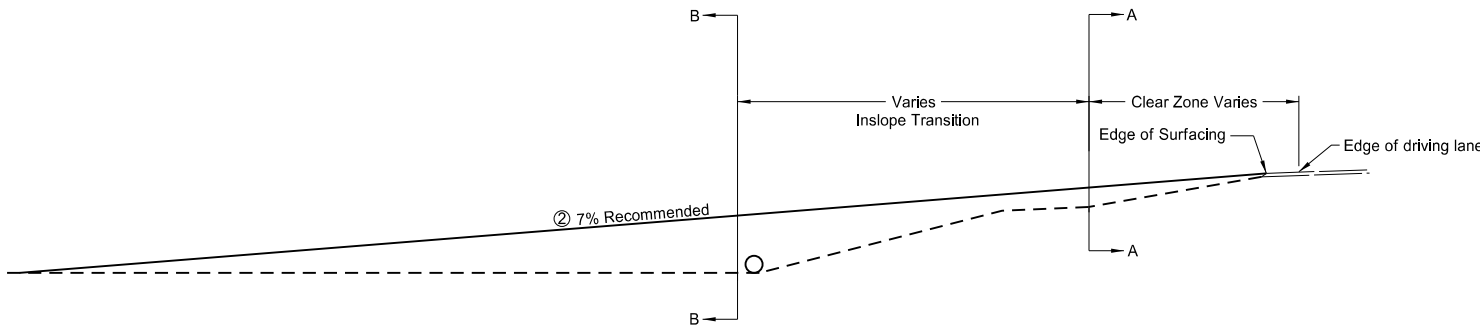
PLAN VIEW RECOVERY APPROACH



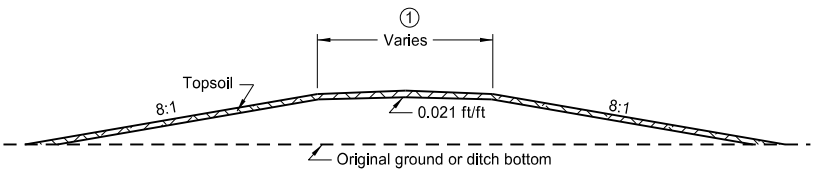
RECOVERY APPROACH GRADE ON CUT SECTION



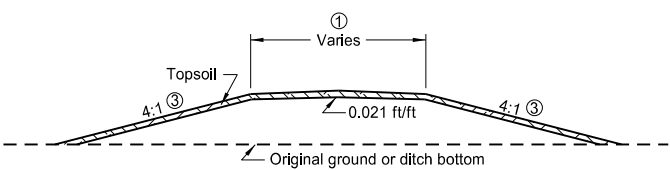
RECOVERY APPROACH GRADE ON FILL SECTION



RECOVERY APPROACH GRADE ON DEEP FILL SECTION



SECTION A-A



SECTION B-B

- Case 1: Ties into existing back slope and within existing right of way. Existing Back Slope is 8:1 or flatter.
- Case 2: Ties into existing back slope and within existing right of way. Existing Back Slope is 4:1 or flatter.
- Case 3: Ties into existing back slope and within existing right of way. Existing Back Slope is 4:1 or flatter.

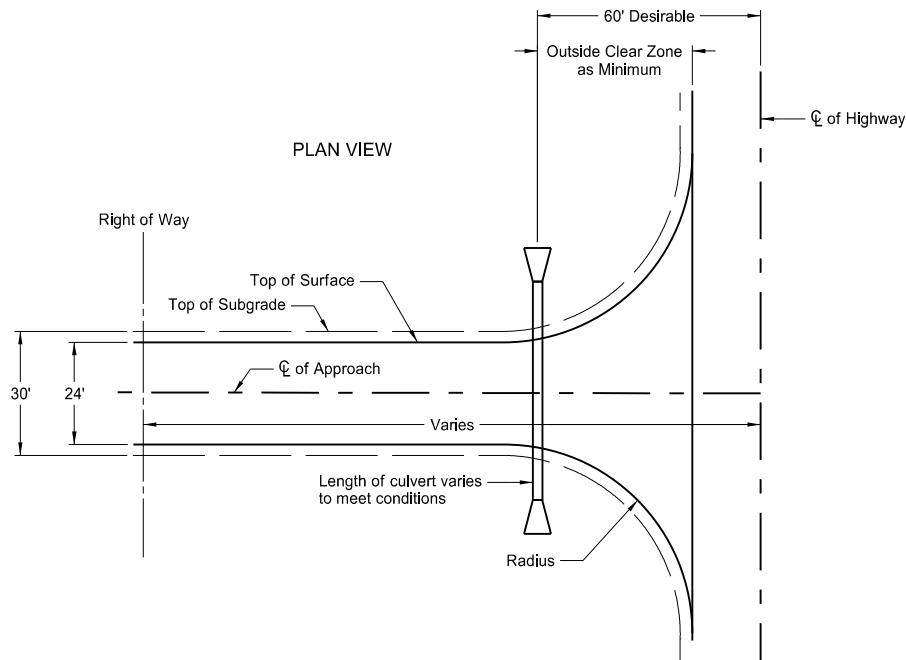
FOOT NOTES

- ① width of recovery approach to match width of terminating county road or state highway
- ② 10% Max
- ③ 3:1 Slope - 20' to 30' fill
2:1 Slope on fills over 30'

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-4-13	
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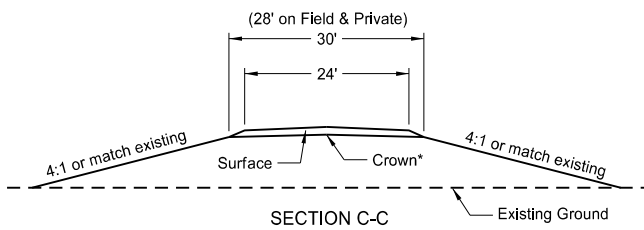
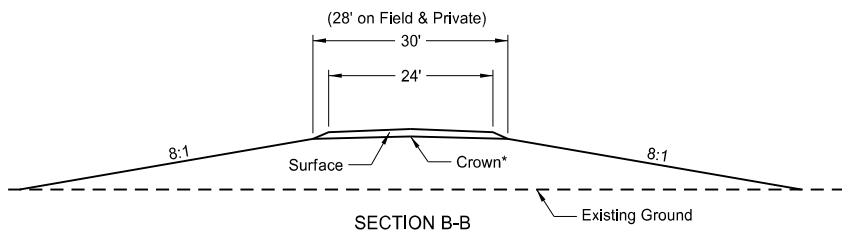
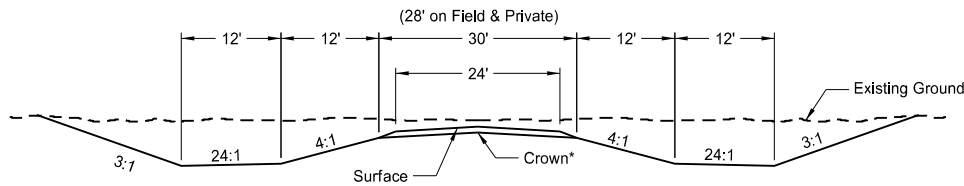
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- NOTES:
- 1. Max breakover between approach storage platform and highway shall not exceed 5%.
 - 2. The approach slope shall be measured outside the area of mainline inslope influence.

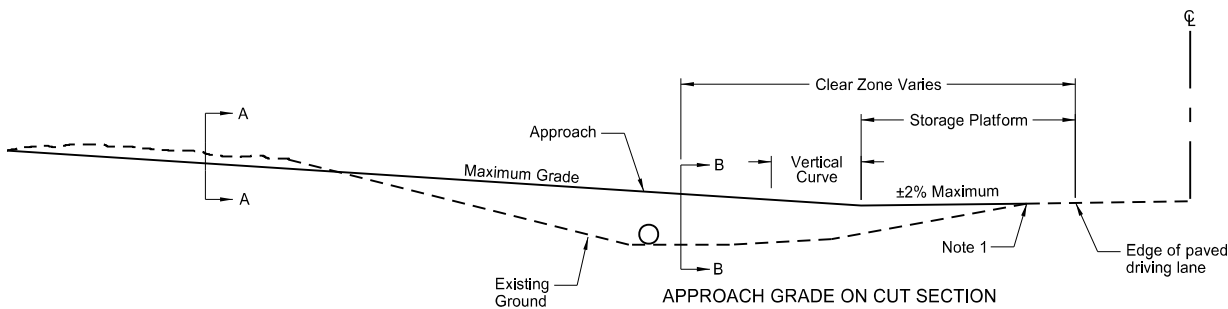
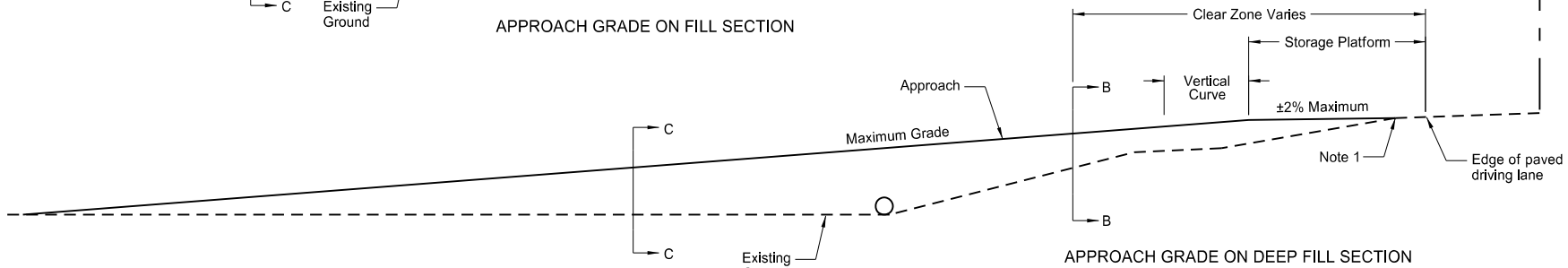
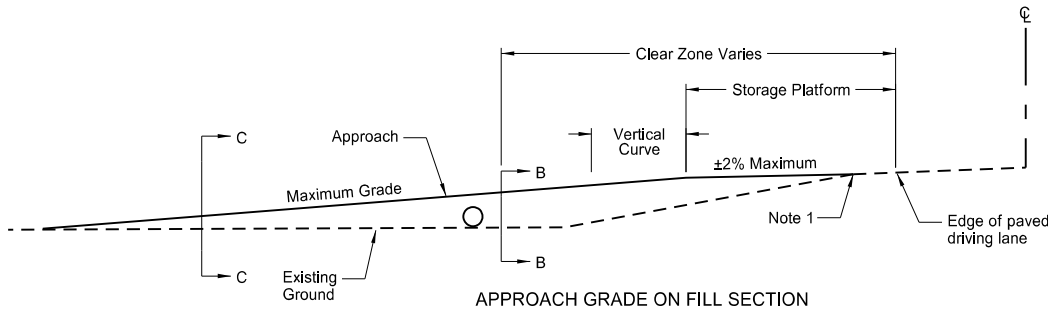
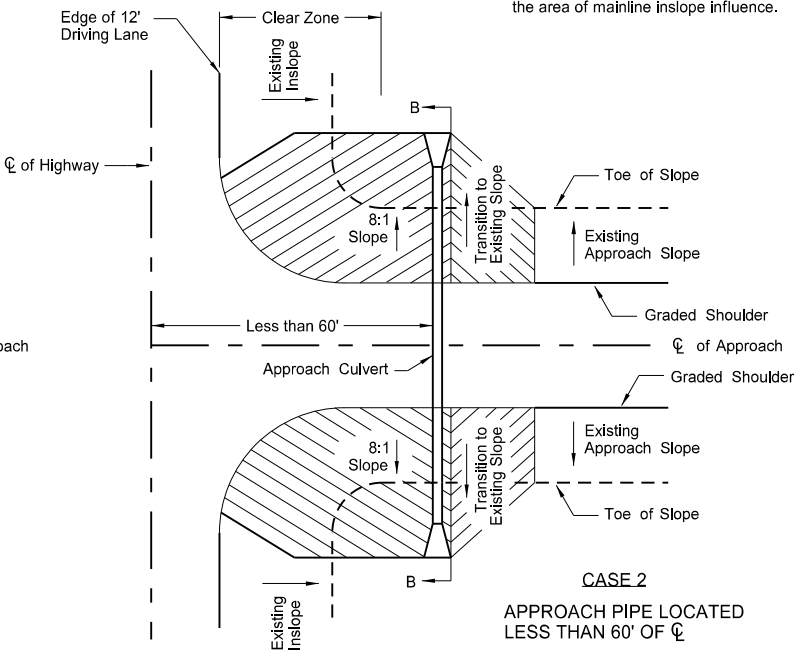
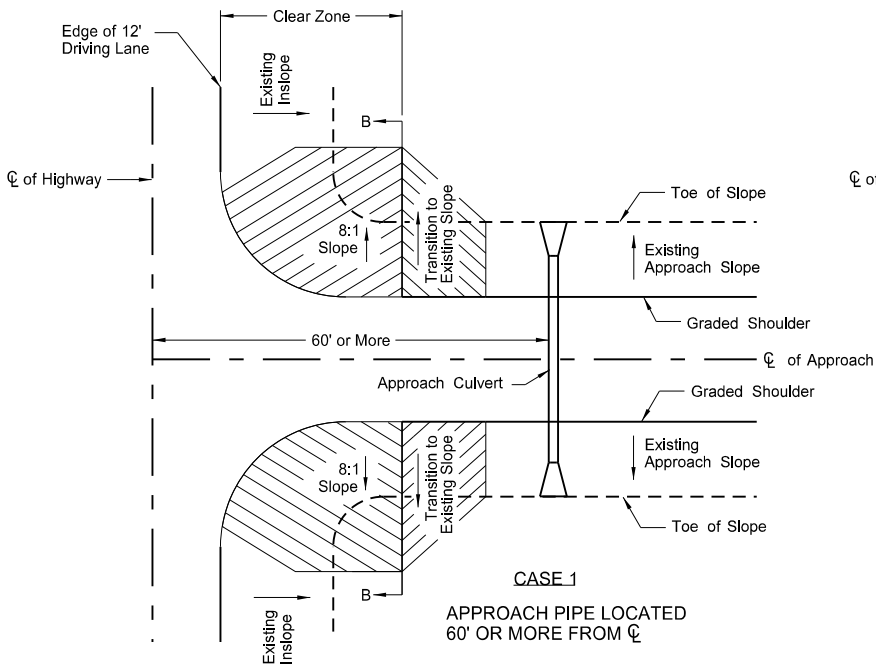


CRITERIA FOR RURAL APPROACH TYPES

	Field Drives	Private Drives	Low Volume Public Roads
Radius	R=24 ft	R=30 ft	R=40 ft
Maximum Grade	10%	7%	7%
Storage Platform	20 ft	24 ft	30 ft
Vertical Curve Length	10 ft	10 ft	Varies (Min. 20 mph)



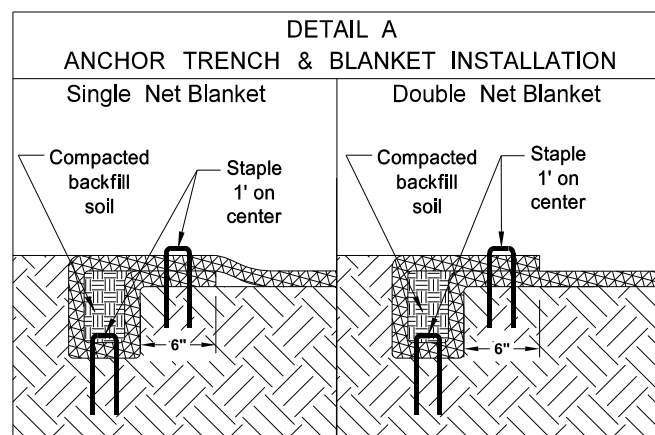
APPROACH INSLOPES



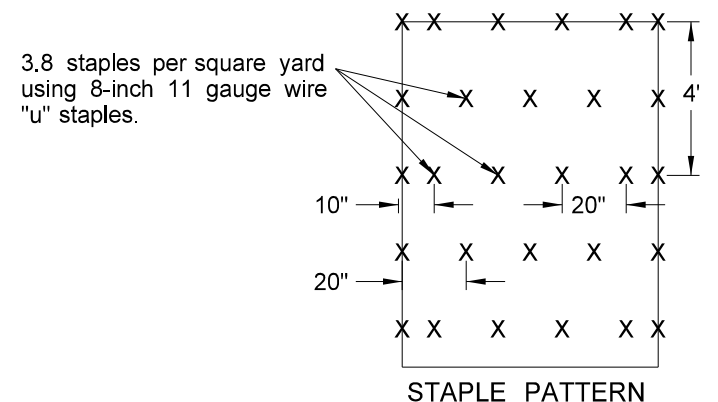
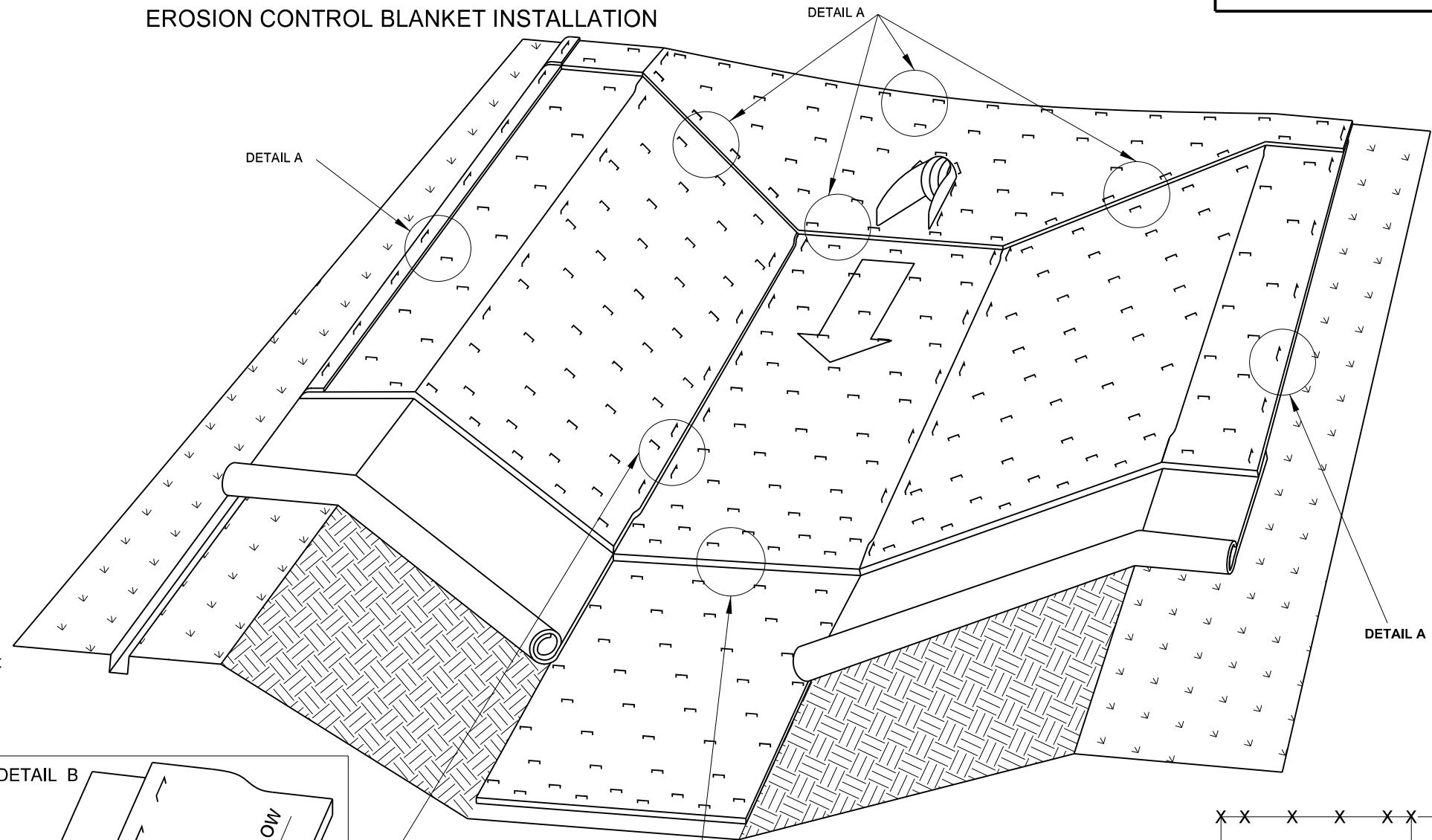
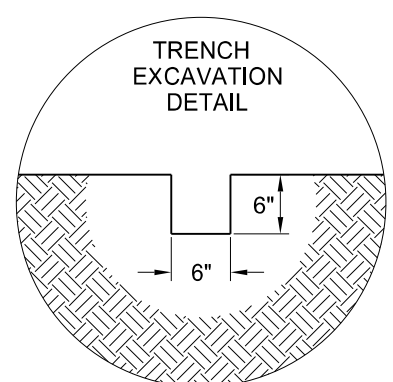
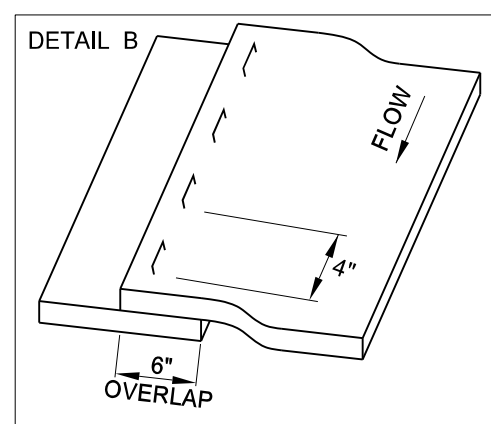
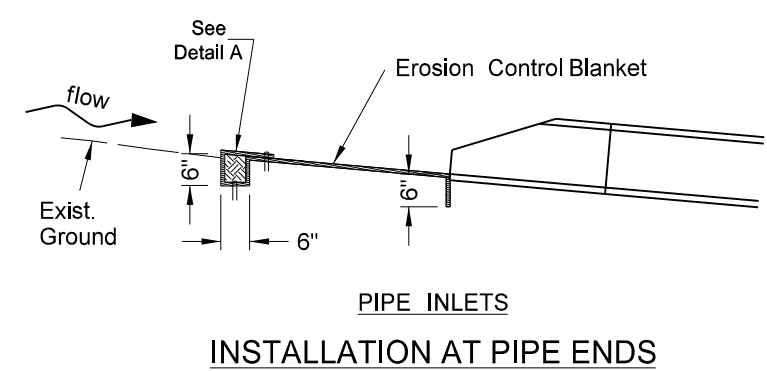
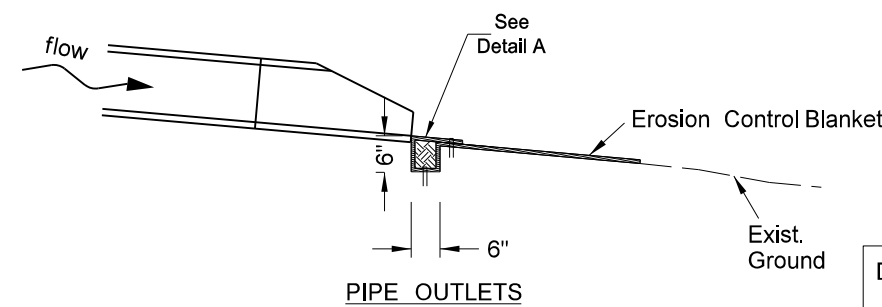
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2-25-14	
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EROSION AND SILTATION CONTROL
EROSION CONTROL BLANKET INSTALLATION

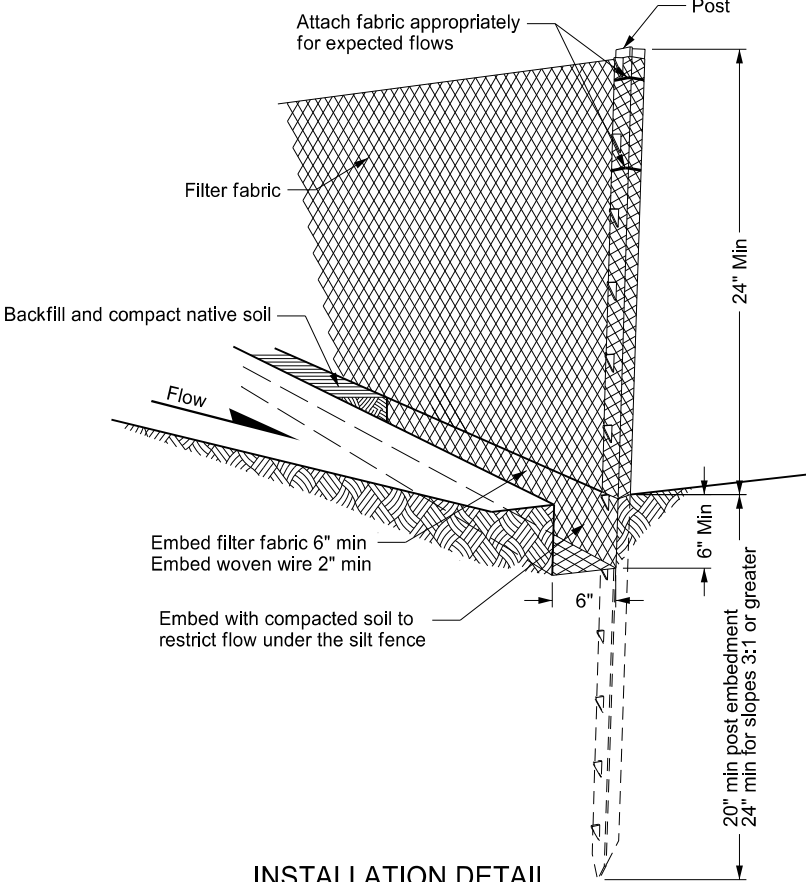


NOTE:
If a Single Net Blanket is used the side with the netting should be on the top once the blanket is installed.

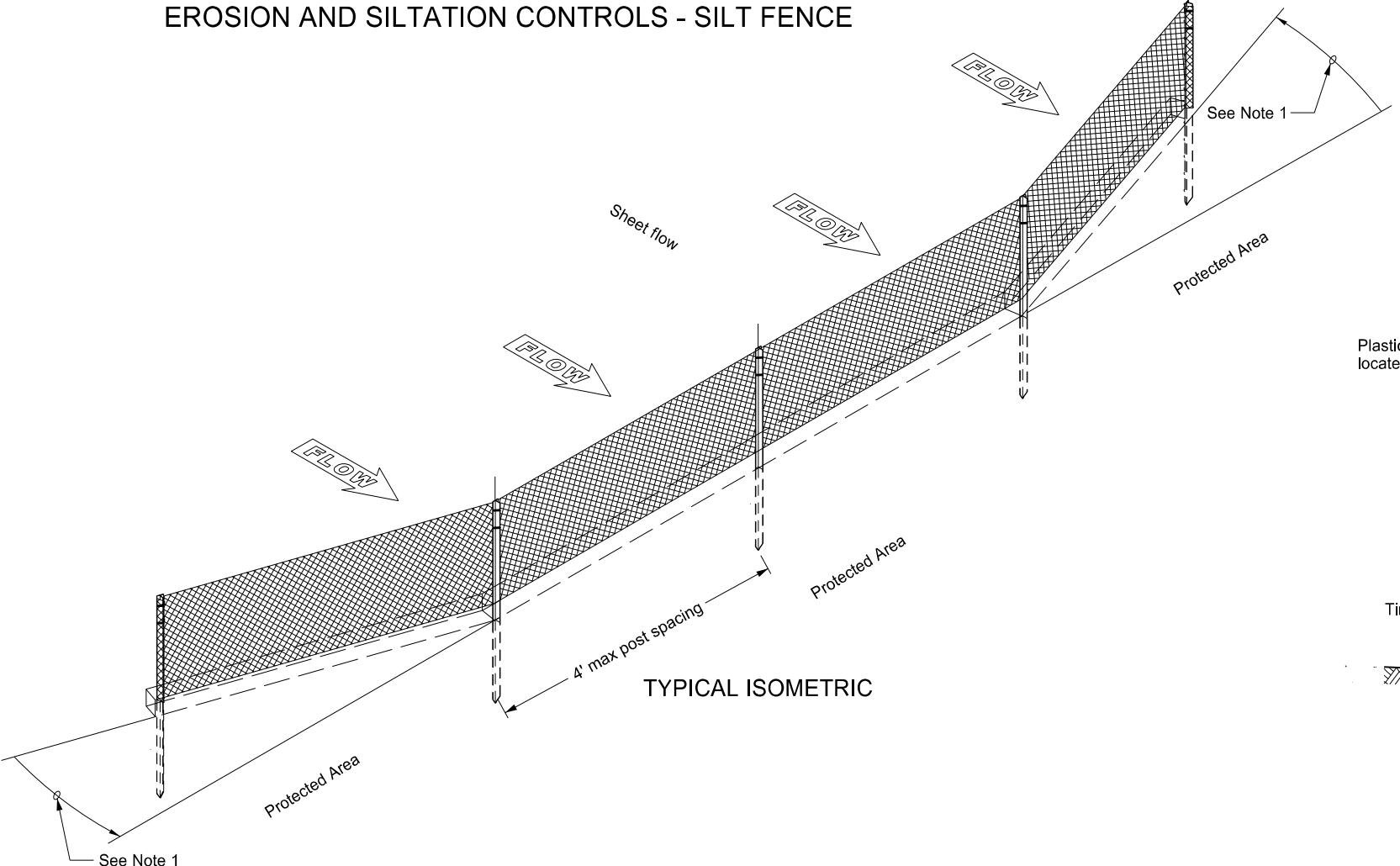


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10-03-13		
REVISIONS		
DATE	CHANGE	
06-26-14	Changed standard drawing number from D-708-5 to D-255-2.	
07-27-15	Changed installation details such as trench depth and overlap dimensions.	

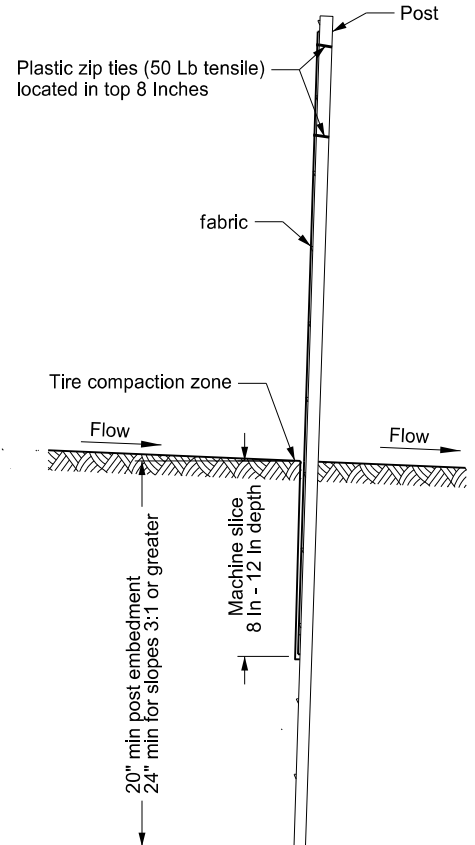
EROSION AND SILTATION CONTROLS - SILT FENCE



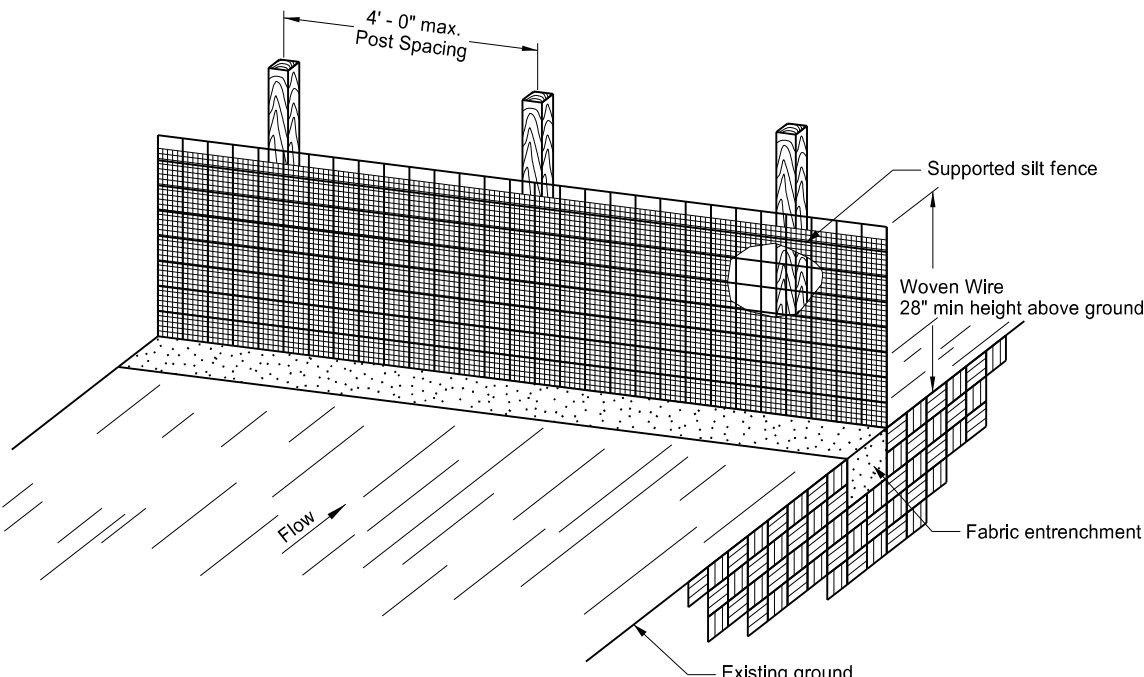
INSTALLATION DETAIL



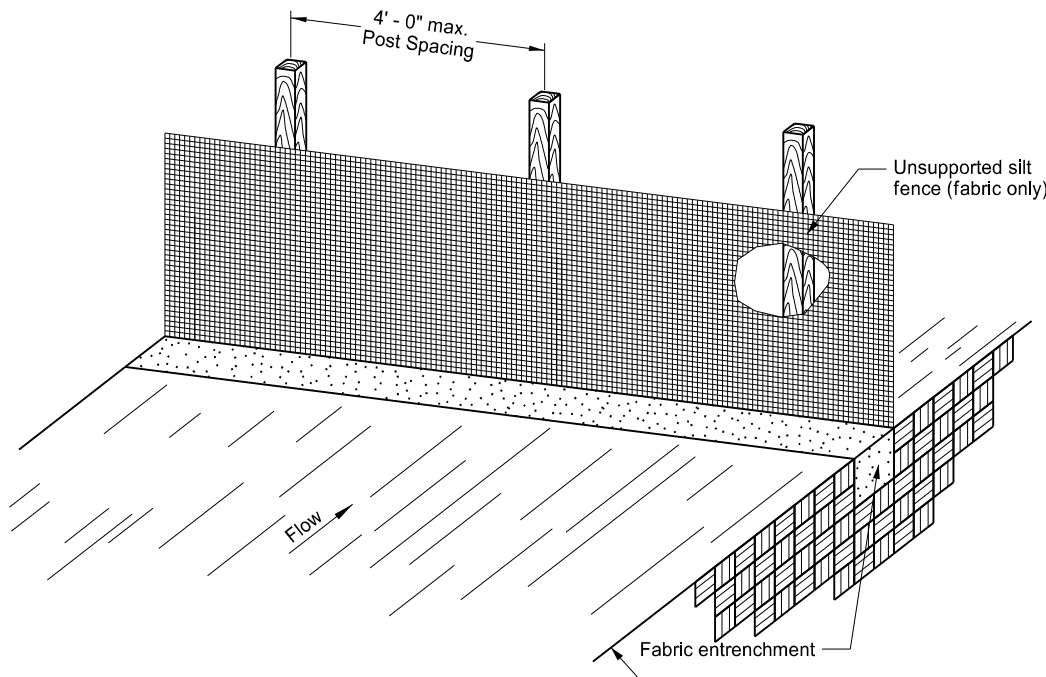
TYPICAL ISOMETRIC



MACHINE SLICED SILT FENCE



SILT FENCE SUPPORTED



SILT FENCE UNSUPPORTED

- NOTES:
- 1. Install the ends of the silt fence to point slightly upslope to prevent sediment from flowing around the ends of the fence.
 - 2. Place splices outside low spots.
 - 3. Install silt fencing parallel to contour lines.
 - 4. Do not embed silt fence when placed in standing water.
 - 5. Silt fence material does not need to reach the top of woven wire support.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
06-26-14	Standard drawing resulted from splitting standard D-708-2.
06-27-16	Revised details & added new ones.

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EROSION CONTROL FIBER ROLL PLACEMENT DETAILS

D-261-1

*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up on adjacent property.

12 OR 20 INCH FIBER ROLL - DITCH BOTTOM

PLAN VIEW FOR SLOPE APPLICATION

PLAN VIEW FOR DITCH APPLICATION

FIBER ROLL DIAMETER	NOMINAL STAKE SIZE	MINIMUM STAKE LENGTH	MINIMUM TRENCH DEPTH	MAXIMUM TRENCH DEPTH
6"	2" x 2"	18"	2"	2"
12"	2" x 2"	24"	2"	3"
20"	2" x 2"	36"	3"	5"

Detail A
Fiber Roll Overlapping Staking Detail

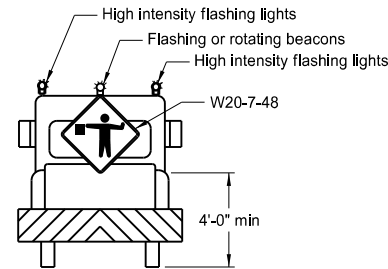
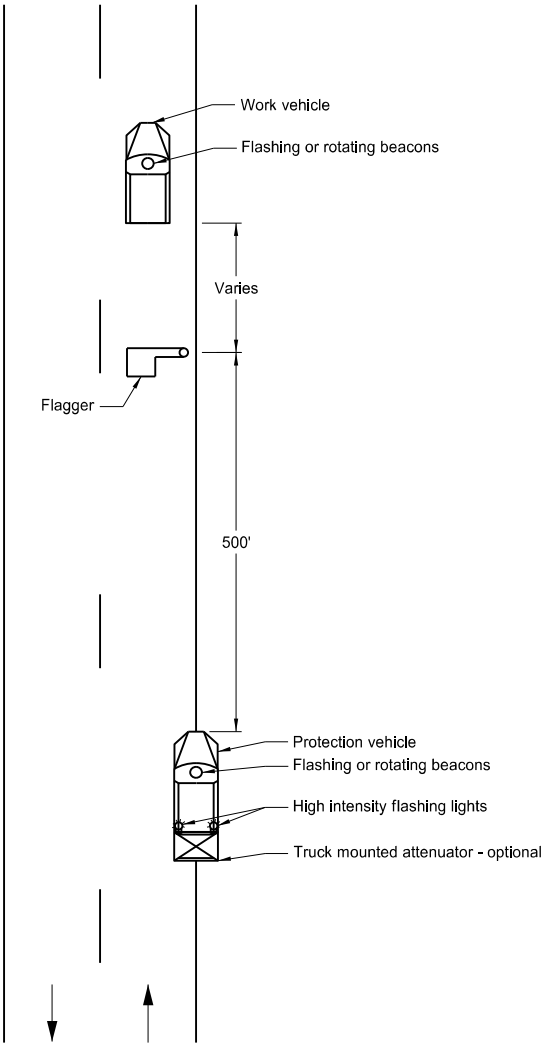
Detail B
Fiber Roll Staking Detail

NOTE: Runoff must not be allowed to run under or around roll.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-18-10	
REVISIONS	
DATE	CHANGE
06-10-13	Added plan view for ditch and slope application. Added table with values for stake and trench dimensions.
10-04-13	Revised fiber roll overlap detail.
06-26-14	Changed standard drawing number from D-708-7 to D-261-1.

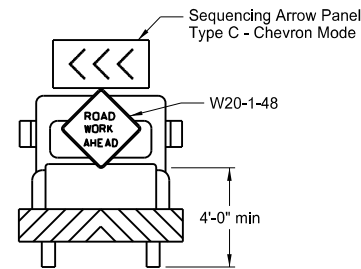
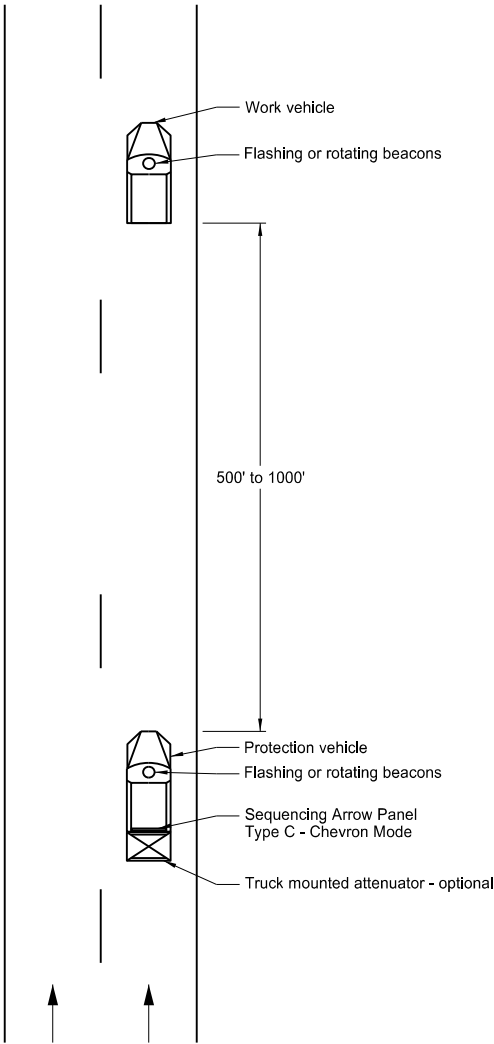
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Two Lane, Two Way Roadways



Typical Protection Vehicle

Multilane Roadways



Typical Protection Vehicle

- Notes:
1. The working vehicle shall display a 360 degree rotating, flashing, oscillating or strobe light.
 2. The shadow vehicle shall display a 360 degree rotating, flashing, oscillating or strobe light. The shadow vehicle for Multilane Roadway shall also have a sequencing arrow panel Type C operated in the chevron mode.
 3. This application is for use during daylight hours and in areas of good visibility only.
 4. Two lane, two way roadway, a flagger shall be used to protect the work area and warn oncoming traffic.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE

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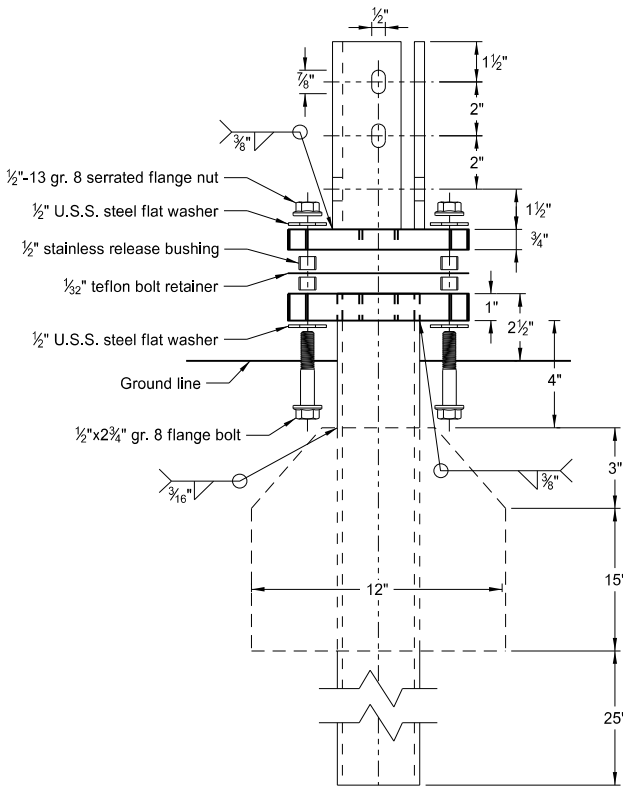
D-704-5

Notes:

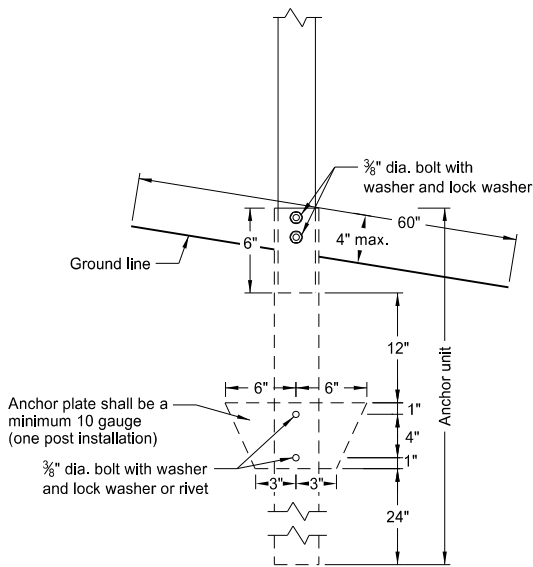
1. Sign shall be placed a distance of $\frac{1}{2}$ A following the End Road Work (G20-2a-48) sign. There shall be a maximum of 2 signs per project.
2. Sign shall be post mounted.
3. Sign required on rural projects with a 30 day or longer duration and it is not required on seal coat projects or other short duration projects.
4. Sign shall not be placed in urban areas or within city limits.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-22-12	
REVISIONS	
DATE	CHANGE
7-18-14	Revise sheeting to type IV

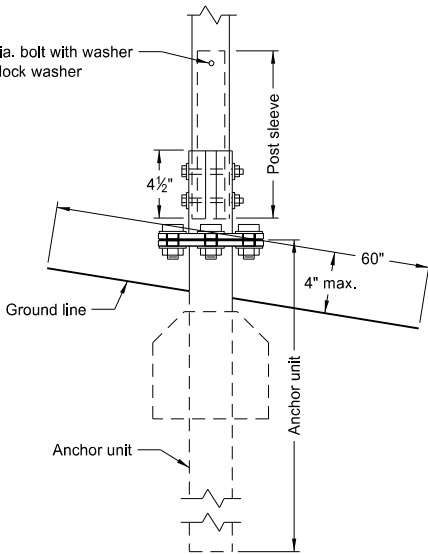
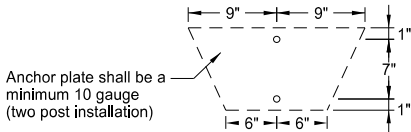
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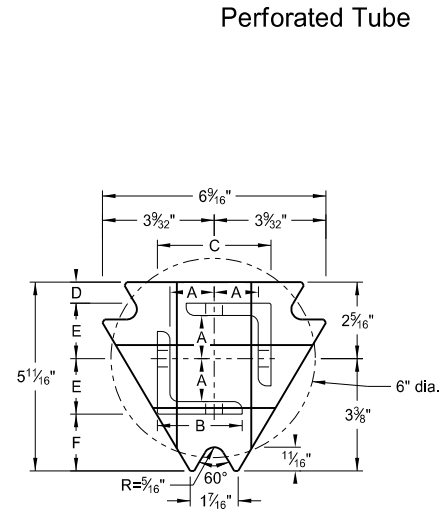
Multi-Directional Slip Base Assembly



Anchor Unit and Post Assembly

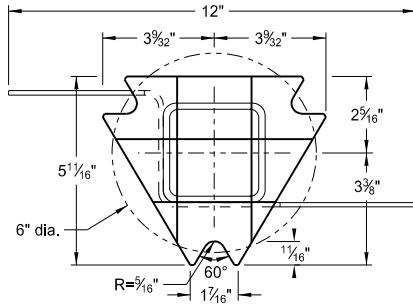


Multi-Directional Slip Base Anchor Unit and Post Sleeve Assembly



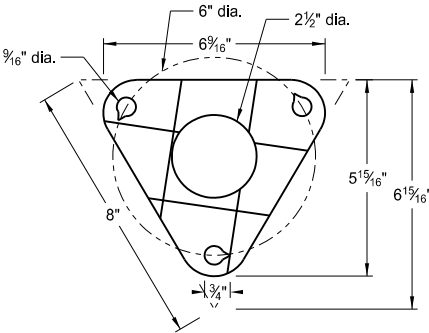
Top Post Receiver

Plate - ASTM A572 grade 50
Angle Receiver - 2 1/2"x2 1/2"x3/8" ASTM A36 structural angle



Bottom Soil Stub

Tube - 3"x3"x7 gauge ASTM A500 grade B tube
Stabilizing Wing - 7 gauge H.R.P.O. ASTM A1011
Plate - ASTM A572 grade 50



Bolt Retainer for Base Connection
Bolt Retainer- 1/32" Reprocessed Teflon

Notes:

1. Slip base bolts shall be torqued as specified by the manufacturer.
2. Anchor shall have a yield strength of 43.9 KSI and tensile strength of 59.3 KSI.
3. The 4" vertical clearance is required for the anchor or breakaway base. The 4"x60" measurement shall be made above and below post location and also back and ahead of the post.
4. When used in concrete sidewalk, anchor shall be same except without the wings.
5. Four post signs shall have over 7' between the first and the fourth posts.

Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thickness Gauge	Sleeve Size in.	Wall Thickness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2 1/4
1	2 1/4	12			No	2 1/2
1	2 1/2	12			(A)	3
1	2 1/2	10			Yes	
1	2 1/4	12	2	12	Yes	
1	2 1/2	12	2 1/4	12	Yes	
2	2	12			No	2 1/4
2	2 1/4	12			No	2 1/2
2	2 1/2	12			Yes	
2	2 1/2	12			Yes	
2	2 1/4	10	2	12	Yes	
2	2 1/2	12	2 1/4	12	Yes	
3 & 4	2 1/2	12			Yes	
3 & 4	2 1/2	10			Yes	
3 & 4	2 1/2	12	2 1/4	12	Yes	
3 & 4	2 1/4	12	2	12	Yes	
3 & 4	2 1/2	10	2 3/16	10	Yes	

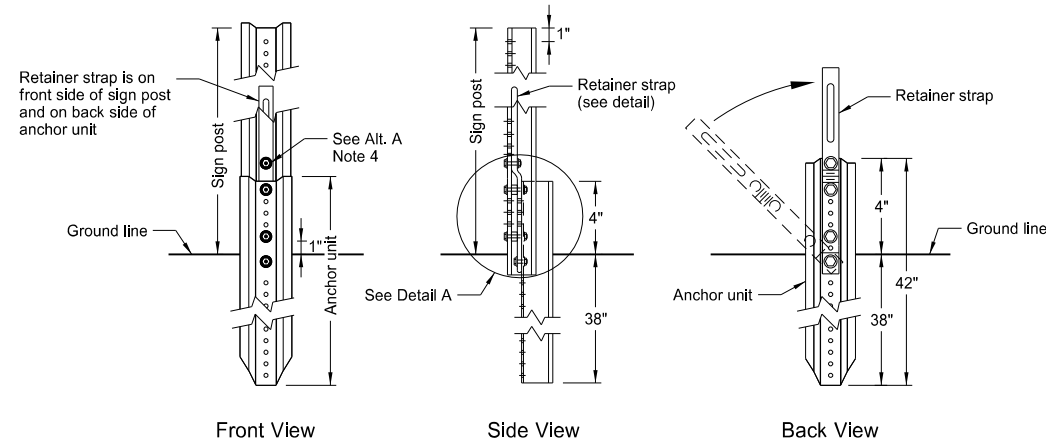
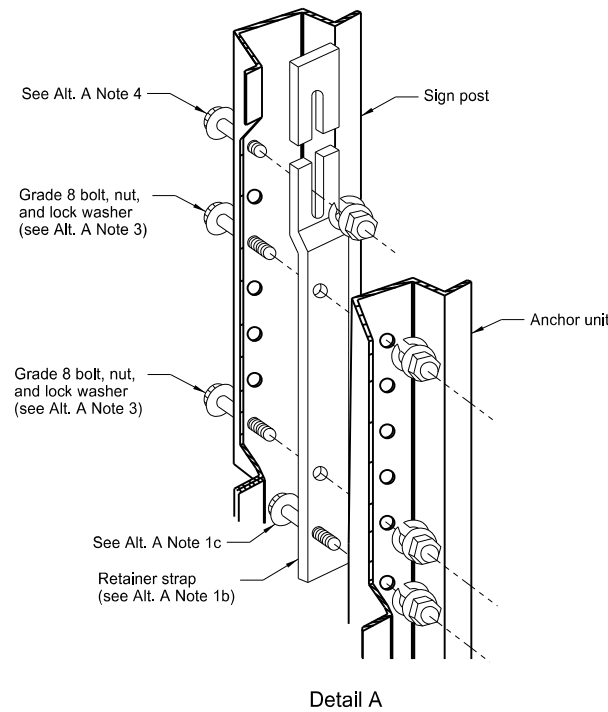
Properties of Telescoping Perforated Tube						
Tube Size in.	Wall Thickness in.	U.S. Standard Gauge	Weight per Foot lbs.	Moment of Inertia in. ⁴	Cross Sec. Area in. ²	Section Modulus in. ³
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499
2 3/16 x 2 3/16	0.135	10	3.432	0.605	0.841	0.590
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.785

Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2 3/16"x10 ga.	1 9/64"	2 1/2"	3 1/32"	2 5/32"	1 33/64"	1 7/8"
2 1/2"x10 ga.	1 9/32"	2 1/2"	3 5/16"	5/8"	1 21/32"	1 3/4"

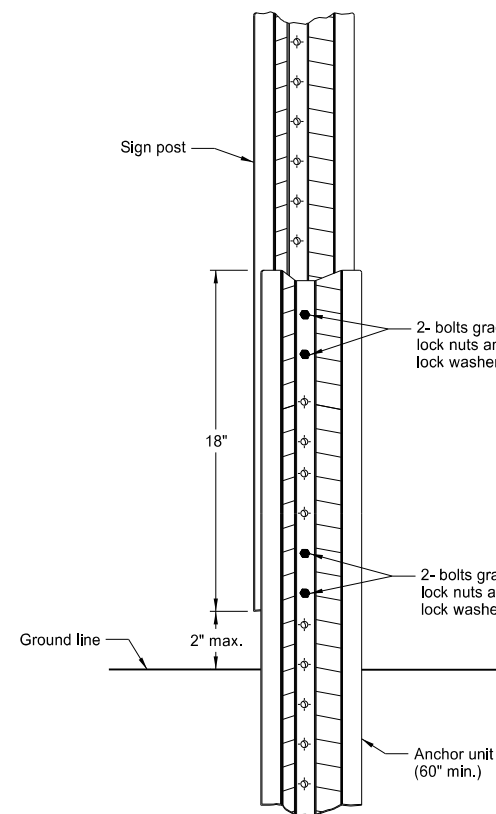
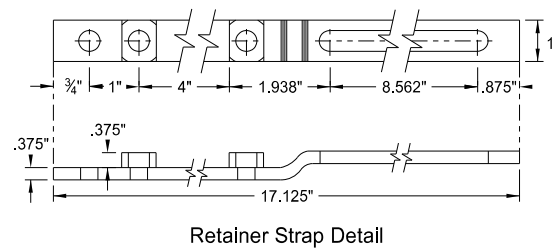
- (A) The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak.
- (B) The 2 3/16"x10 ga. may be inserted into 2 1/2"x10 ga. for additional wind load.

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REVISIONS		
DATE	CHANGE	

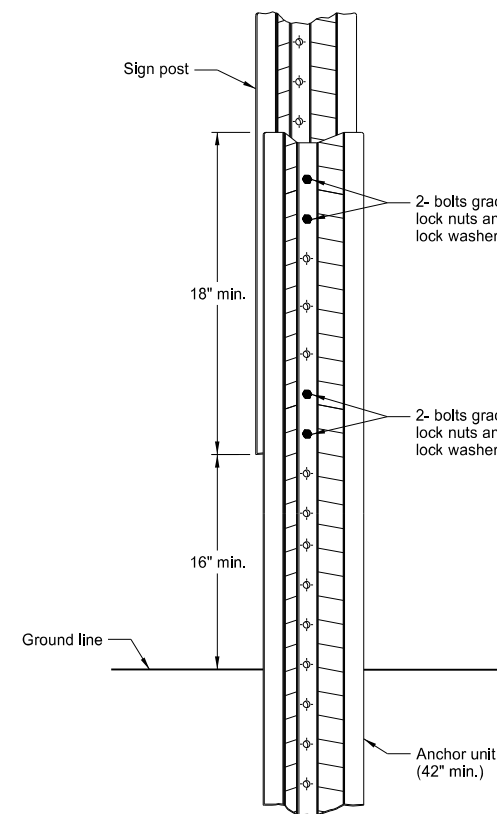
U-Channel Post



Breakaway U-Channel Detail Alternate A
A maximum of 2 posts shall be installed within 7'.



Breakaway U-Channel Splice Detail Alternate B
(2.5 and 3 lb/ft)
A maximum of 3 posts shall be installed within 7'.



Breakaway U-Channel Splice Detail Alternate C
(2.5 and 3 lb/ft)
A maximum of 3 posts shall be installed within 7'.

Alternate A Steps of Installation:

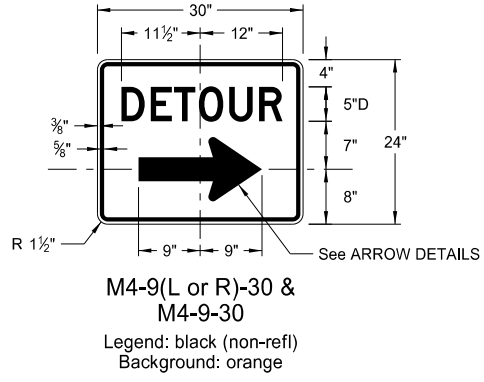
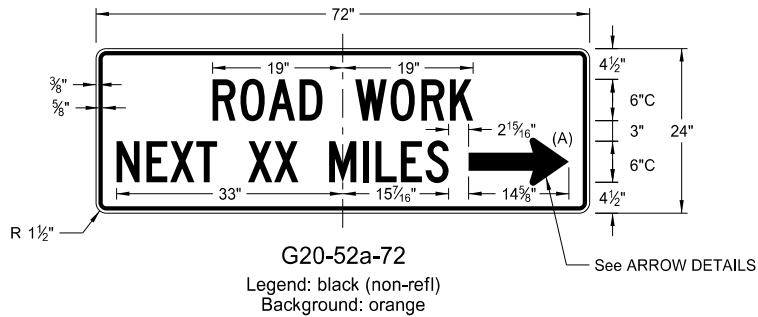
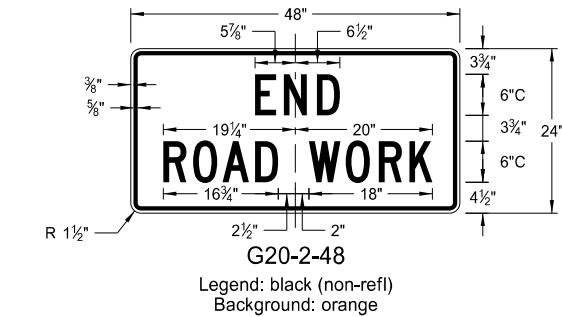
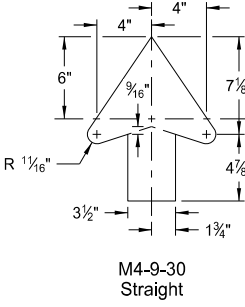
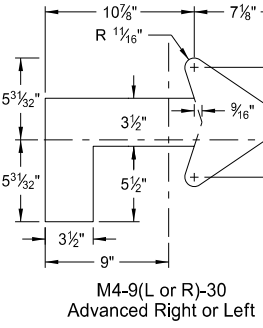
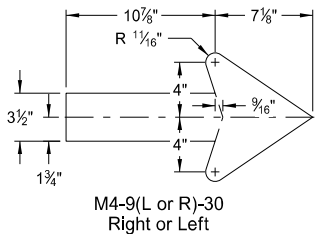
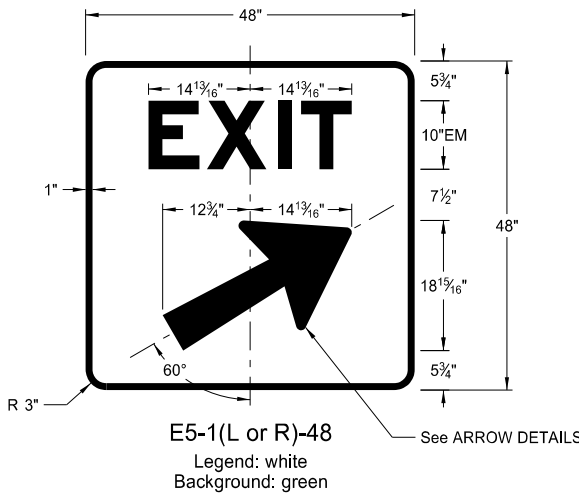
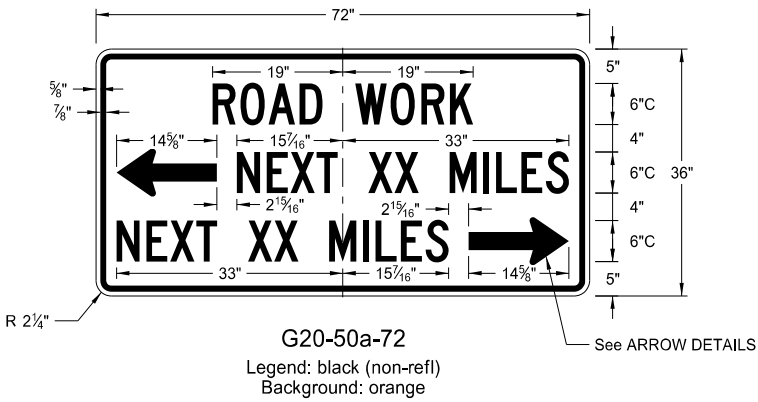
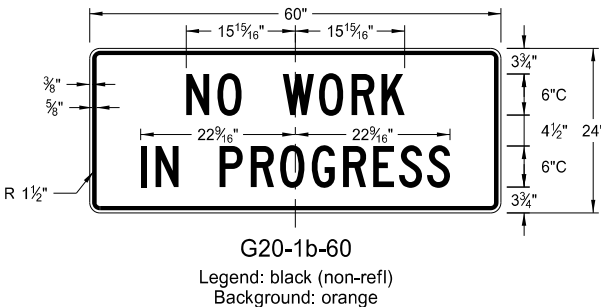
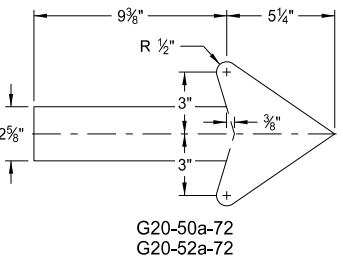
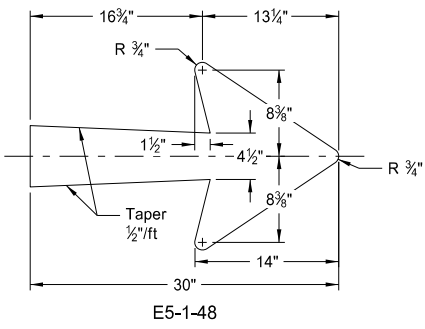
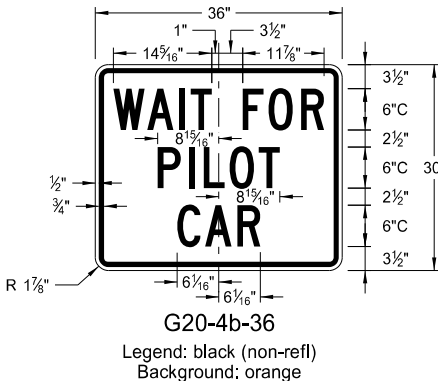
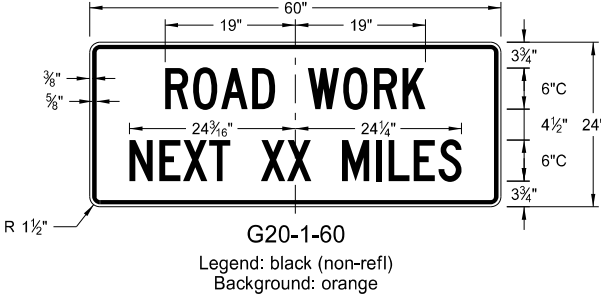
- a) Drive anchor unit to within 12" of ground level.
b) Proper assembly established by lining up the bottom hole of retainer strap with the 6th hole from the top of the anchor unit.
c) Assemble strap to back of anchor unit using 5/16"x2" bolt, lock washer and nut.
d) Rotate strap 90° to left.
- a) Drive anchor unit to 4" above ground.
b) Rotate strap to vertical position.
- a) Place 5/16"x2" bolt, lock washer and nut in bottom of sign post to facilitate alignment of sign post with proper hole in anchor unit.
b) Alternately tighten two connector bolts.
- Complete assembly by tightening 5/16"x2" bolt (this fastens sign post to retainer strap).
- The base post, strap and sign post shall be properly nested. Proper nesting occurs when all flat surfaces of the base post, strap, and sign post at the bolts have full contact across the entire width.

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2-28-14	
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CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS

D-704-9



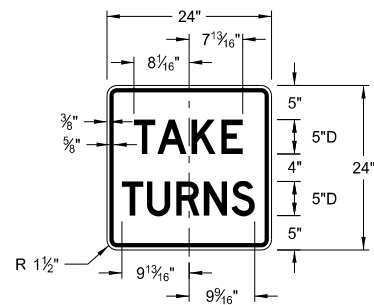
ARROW DETAILS

NOTES:
(A) Arrow may be right or left of the legend to indicate construction to the right or left.

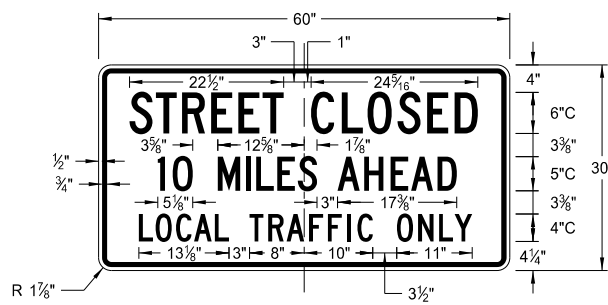
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8-13-13		
REVISIONS		
DATE	CHANGE	

CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS

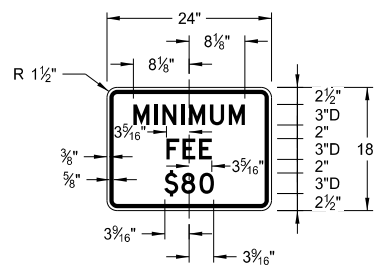
D-704-10



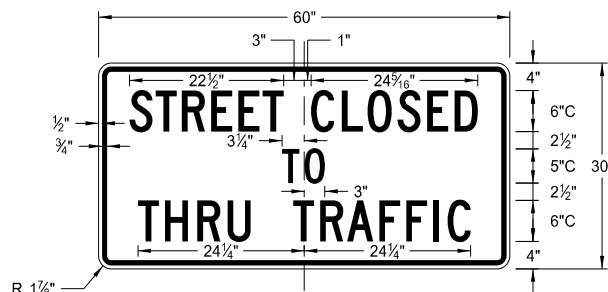
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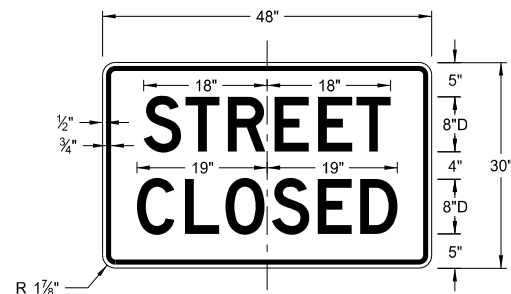
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R2-1a-24
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R11-4a-60
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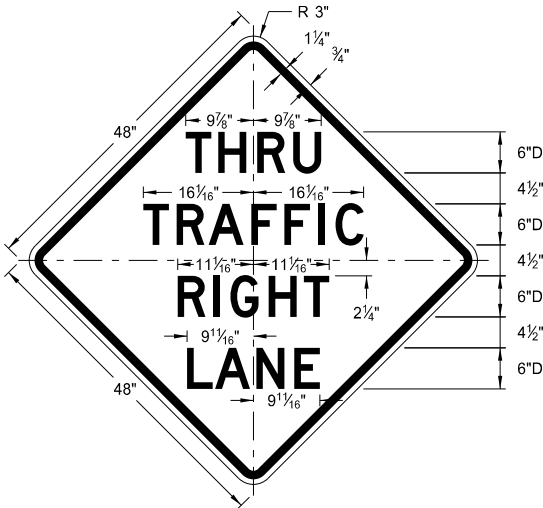
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8-13-13	
REVISIONS	
DATE	CHANGE

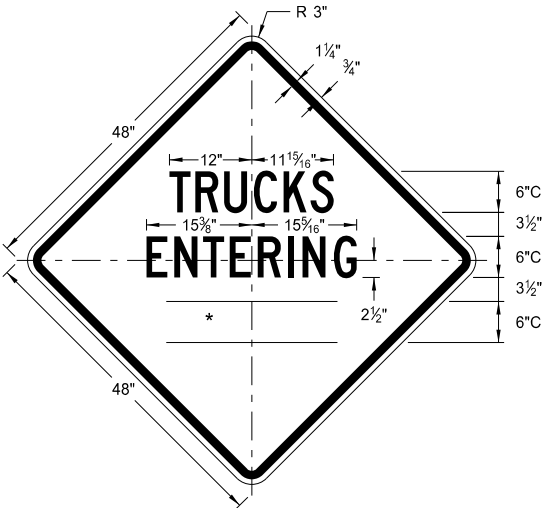
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CONSTRUCTION SIGN DETAILS
WARNING SIGNS

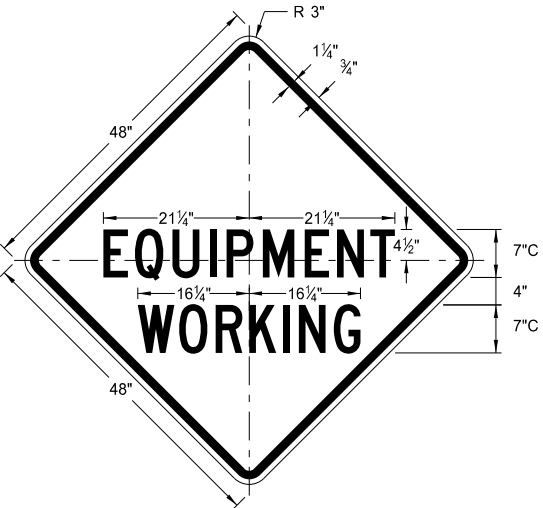
D-704-11



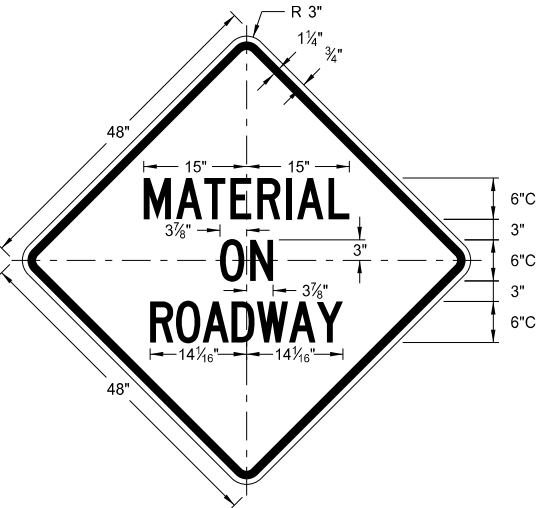
W5-8-48
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Background: orange



W8-54-48
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Background: orange



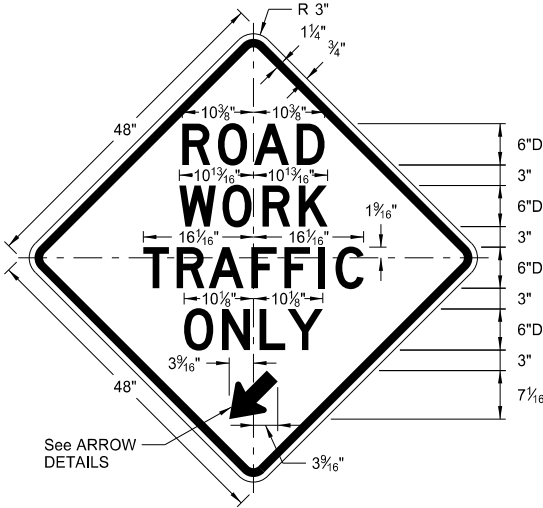
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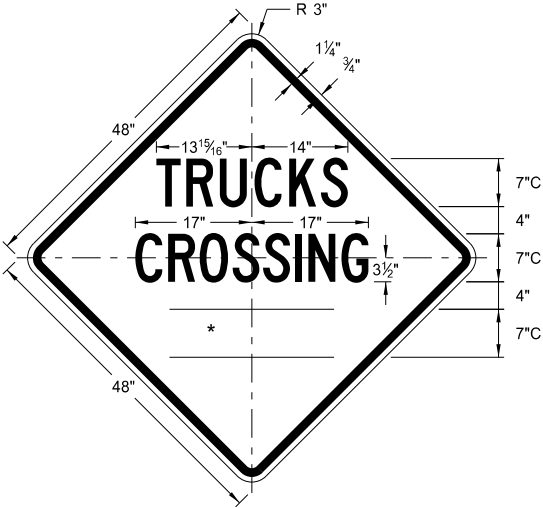
W21-51-48
Legend: black (non-refl)
Background: orange

WORD	LETTER SPACING
AHEAD	Standard
200 FT	Standard
350 FT	Standard
500 FT	Standard
1000 FT	Reduce 40%
1500 FT	Reduce 40%
1/2 MILE	Reduce 50%
1 MILE	Standard

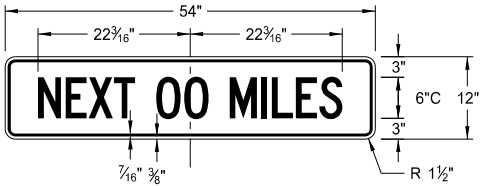
* DISTANCE MESSAGES



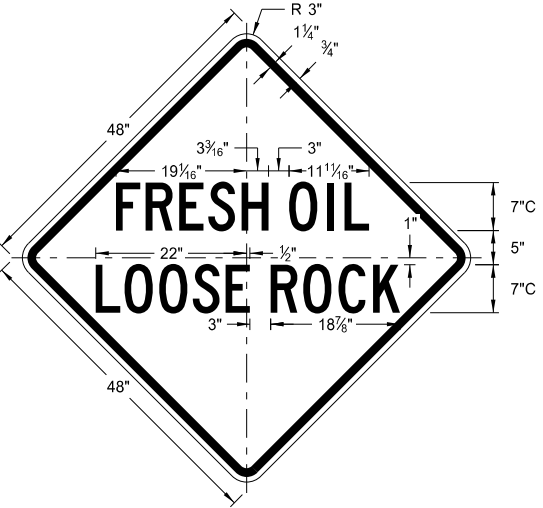
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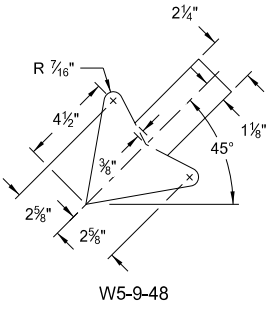
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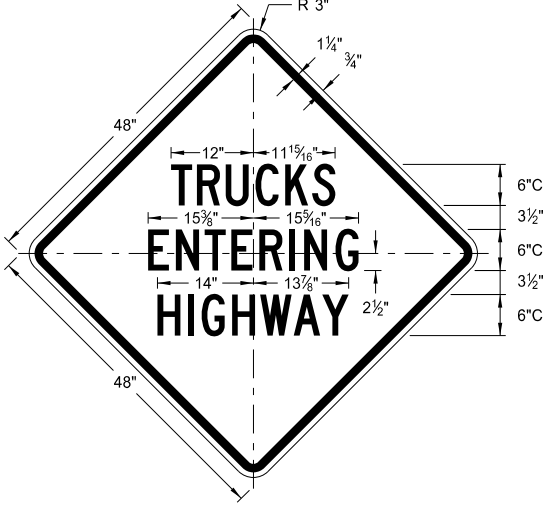
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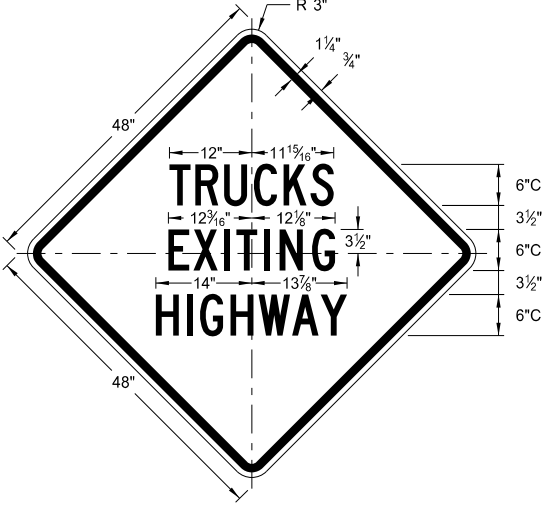
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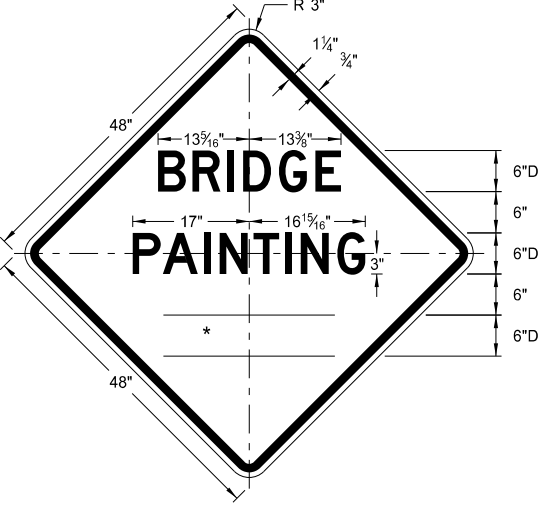
W5-9-48
ARROW DETAILS



W8-53-48
Legend: black (non-refl)
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W8-56-48
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Background: orange



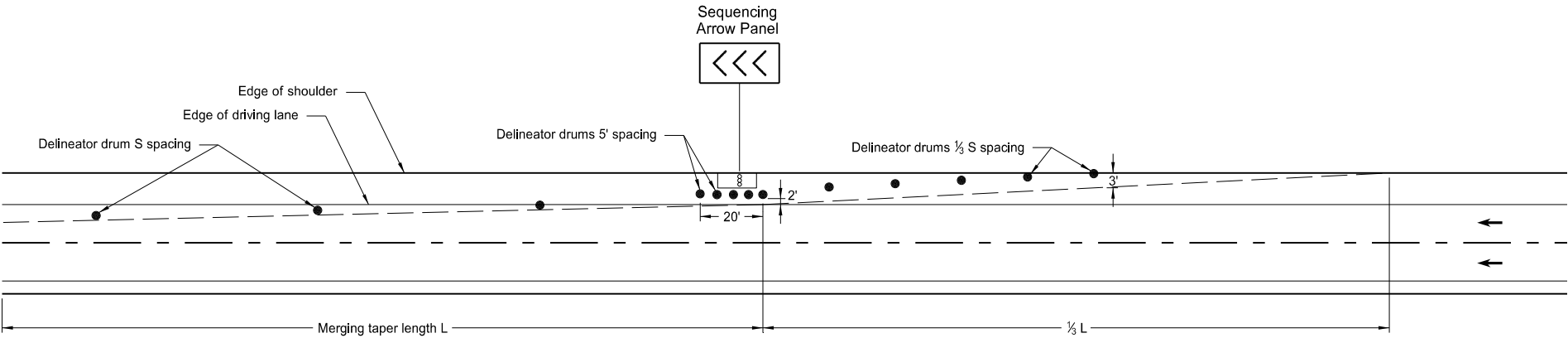
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NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE

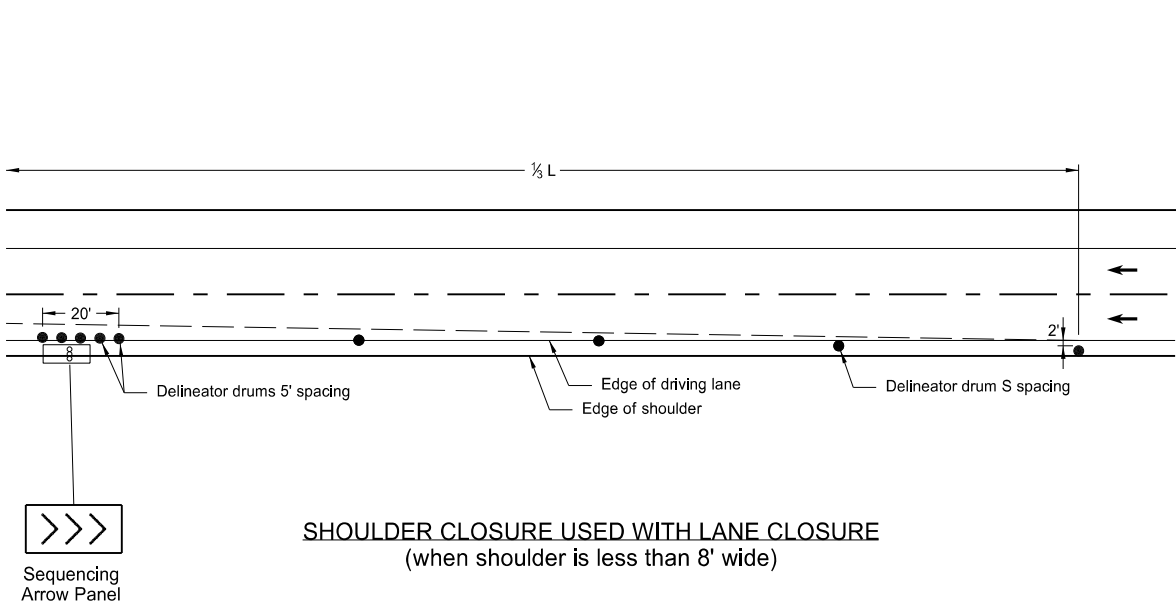
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SHOULDER CLOSURE TAPERS

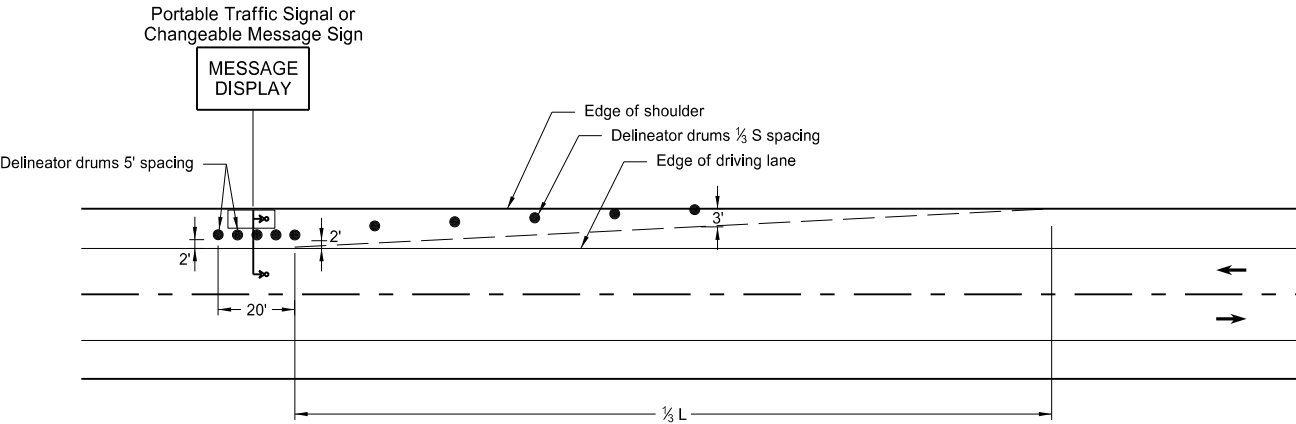
D-704-12



SHOULDER CLOSURE WITH LANE CLOSURE
(when shoulder is 8' or wider)



SHOULDER CLOSURE USED WITH LANE CLOSURE
(when shoulder is less than 8' wide)



PORTABLE TRAFFIC SIGNAL OR CHANGEABLE MESSAGE SIGN ON SHOULDER

KEY			
●	Delineator Drum	∞	Sequencing Arrow Panel
•	Message Display	↳	Portable Traffic Signal

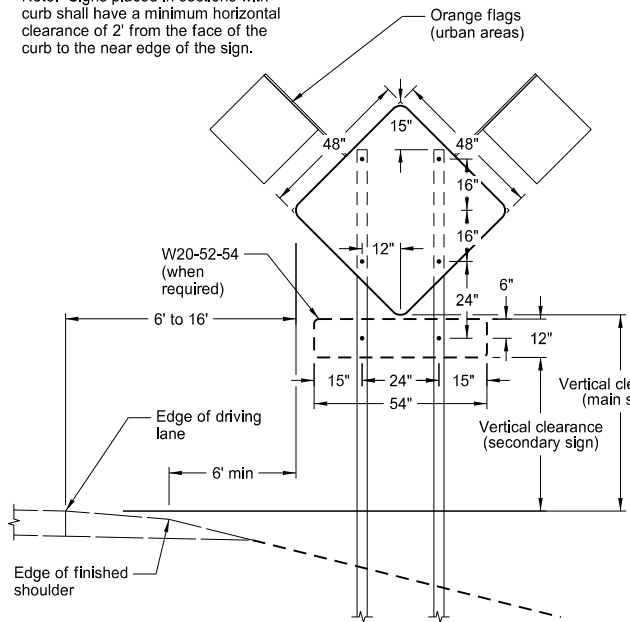
- Notes:
- S = Posted Speed Limit in mph
W = Width of offset in feet
L = Taper length in feet
 $L = WS^2/60$ (40mph or less)
 $L = WS$ (45mph or more)
 - If a shoulder taper is used, it should have a length of approximately $1/3L$. If a shoulder is used as a travel lane, a normal merging or shifting taper should be used.
 - When paved shoulders of 8 foot width or more are closed, channelizing devices shall be used to close the shoulder in advance to delineate the beginning of the work space and direct vehicular traffic to remain within the traveled way.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE

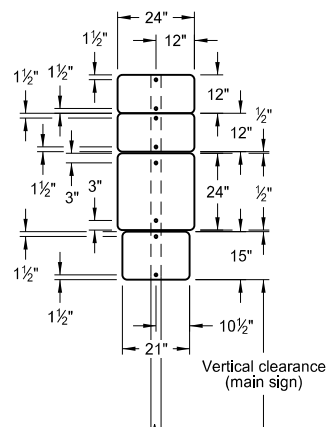
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of Transportation

CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

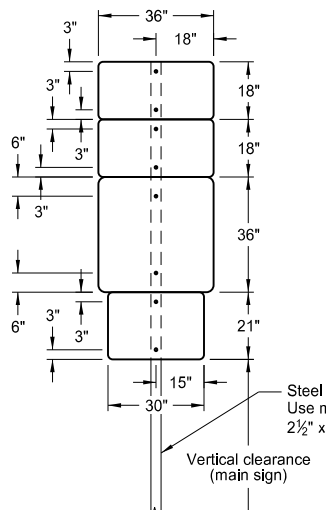
Note: Signs placed in sections with curb shall have a minimum horizontal clearance of 2' from the face of the curb to the near edge of the sign.



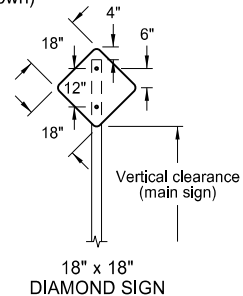
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



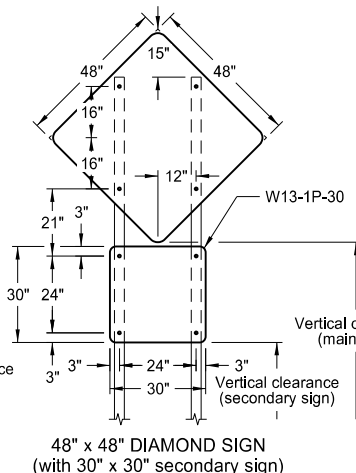
24" x 24" ROUTE MARKER ASSEMBLY



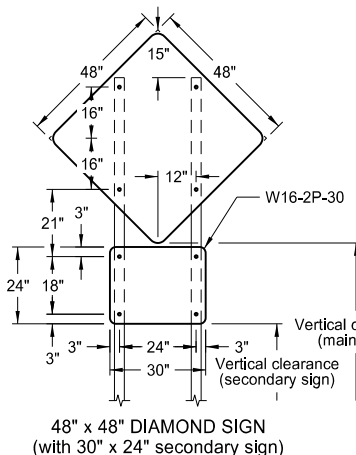
36" x 36" ROUTE MARKER ASSEMBLY



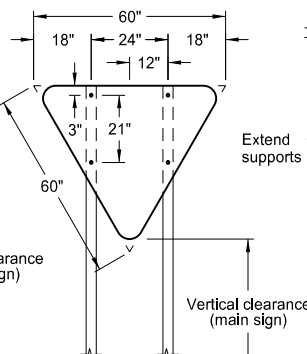
18" x 18" DIAMOND SIGN



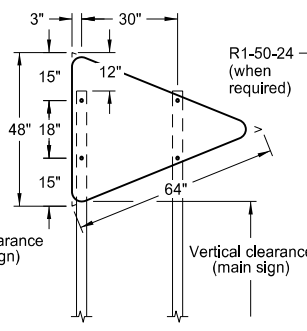
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



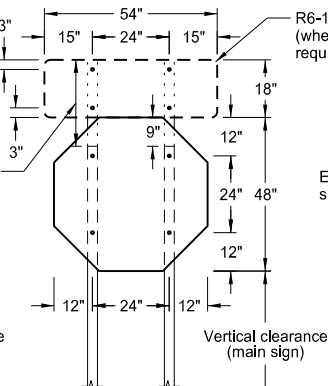
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



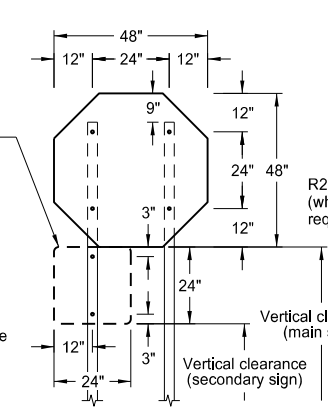
R1-2-60 - YIELD SIGN



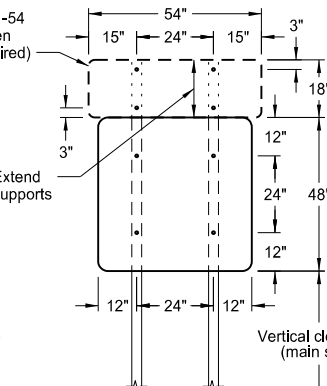
W14-3-64 - PENNANT SIGN



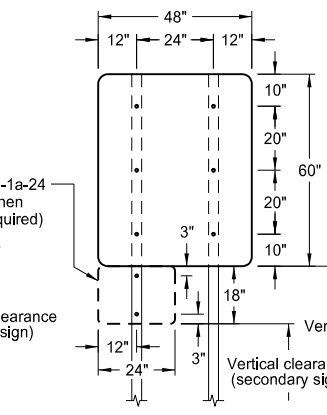
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



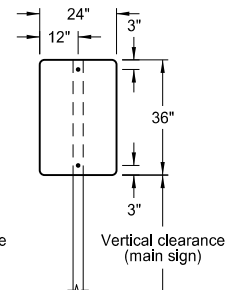
R1-1-48 - STOP SIGN
(with R1-50-24 sign as required)



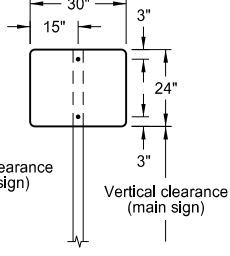
48" x 48" SIGN
(with R6-1-54 sign as required)



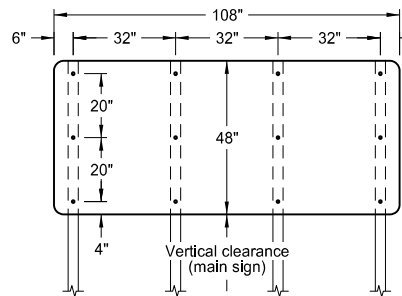
48" x 48" SIGN
(with R2-1a-24 sign as required)



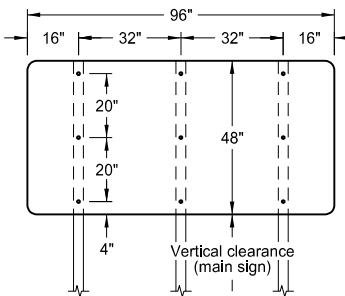
24" x 36" SIGN



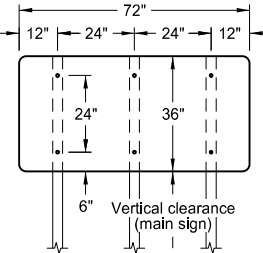
30" x 24" SIGN



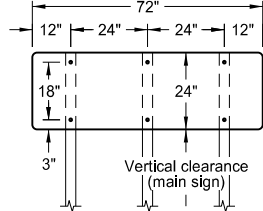
108" x 48" SIGN



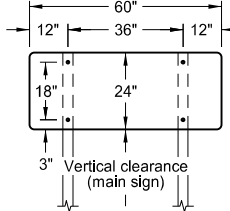
96" x 48" SIGN



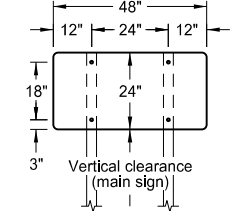
72" x 36" SIGN



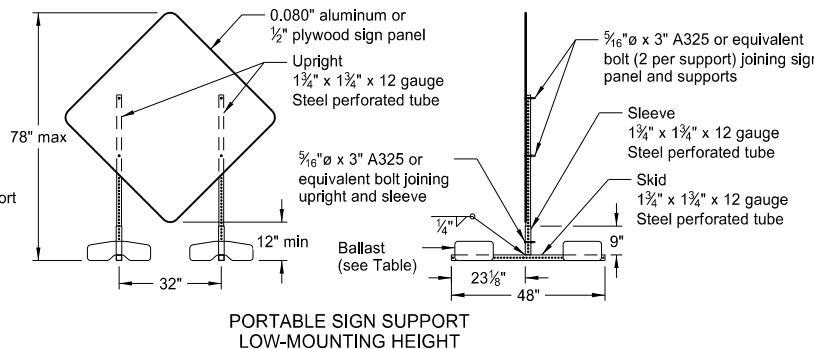
72" x 24" SIGN



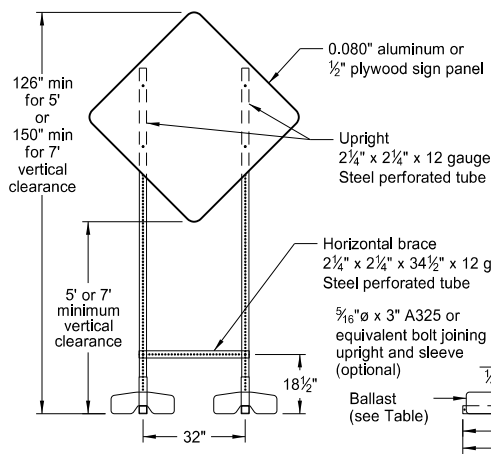
60" x 24" SIGN



48" x 24" SIGN



PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT



PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

NOTES:

1. Sign Supports: Supports shall be galvanized or painted. Minimum post sizes are 2.5 lb/ft u-channel or 2" x 2" x 12 gauge steel perforated tube, except where noted. When installing signs on u-channel, the minimum post size for assemblies containing a secondary sign is 3.0 lb/ft. Post sizes are based on a wind speed of 55 MPH.

Signs over 50 square feet should be installed on 2½" x 2½" perforated tube supports as a minimum.

Guy wires shall not be attached to sign supports. Wind beams may be attached to u-posts behind the sign panels.

2. Sign Panels: Provide sign panels made of 0.100" aluminum, ½" plywood, or other approved material, except where noted. All holes to be punched round for ⅜" bolts.

3. Alternate Messages: The signs that have alternate messages may have these alternate messages placed on a reflectorized plate (without a border) and installed and removed as required. (i.e. "Left" and "Right" message on a lane closure sign)

4. Route Marker Auxiliary Signs: Provide route marker auxiliary signs, such as the cardinal direction and directional arrows, with a background and legend that match the route marker they are used with:

Interstate - white legend on blue background
Interstate Business Loop - white legend on green background
US and State - black legend on white background
County - yellow legend on blue background

5. Vertical Clearance: Install signs with a vertical clearance of 5'-0" (see TYPICAL SECTION.) In areas where parking or pedestrian movements are likely or the view of the sign may be obstructed, install signs with a vertical clearance of 7'-0" from the top of the curb or from the near edge of the driving lane in absence of a curb.

The vertical clearance to secondary signs is 1'-0" less than the vertical clearance as stated above.

Large signs having an area exceeding 50 square feet shall have a minimum clearance of 7'-0" from the ground at the post.

6. Portable Signs: Provide portable signs that meet the vertical clearance as stated above. Use portable signs when it is necessary to place signs within the pavement surface.

When portable signs are used for 5 days or less, low-mounting height (minimum 12" vertical clearance) sign supports may be used as long as the view of the sign is not obstructed. Time delays caused by unforeseen circumstances, such as equipment breakdown, rain, subgrade failures, etc., will not accrue towards the 5 day period. The R9-8 through R9-11a series, W1-6 through W1-8 series, M4-10, and E5-1 may be used for longer than 5 days.

Signs mounted to the portable sign supports shown in the LOW-MOUNTING HEIGHT and HIGH-MOUNTING HEIGHT Details shall have a maximum surface area of 16 square feet.

MINIMUM BALLAST (For each side of sign support base)

Sign Panel Mounting Height (ft)	Number of 25 lb sandbags for 4' x 4' sign panel
1'	6
5'	8
7'	10

Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-4-13	
REVISIONS	
DATE	CHANGE
11-14-13	Revised Note 6.

This document was originally issued and sealed by
Roger Weigel,
Registration Number
PE-2930,
on 11/14/13 and the original document is stored at the
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ROAD CLOSURE LAYOUTS

Notes

- Variables
S = Numerical value of speed limit or 85th percentile.
W = The width of taper.
L = Minimum length of taper, or $S \times W$ for freeways, expressways, and all other roads with speeds of 45 mph or greater, or $W \times S^2/60$ for urban, residential, and other streets with speeds of 40 mph or less.
- Barricades placed on roadway shall be on a moveable assembly. Signs placed on roadway shall be placed on skid mounted assemblies.
- Delineator drums, barricades or cones used for tapering traffic shall be spaced at the dimension "S". Delineator drums or cones used for tangents shall be spaced at 2 times dimension "S".
- Sequencing Arrow Panels
Panels should normally be placed at the beginning of the taper. Where shoulder width does not provide sufficient room, the panel should be moved closer to the work area so that it can be placed on the roadway surface. See Shoulder Closure Standard Drawing.
Type A shall be used on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
Type B shall be used on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
Type C shall be used on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
- The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
- The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at $\frac{1}{2}$ B.
- Use when work area is 1 mile or longer.
- When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
- Existing speed limit signs within a reduced speed zone shall be covered.
- Where necessary, safe speed to be determined by the Engineer.
- The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
- G20-55-96 sign is not required if this standard is part of other traffic control layouts, or the work is less than 15 days.

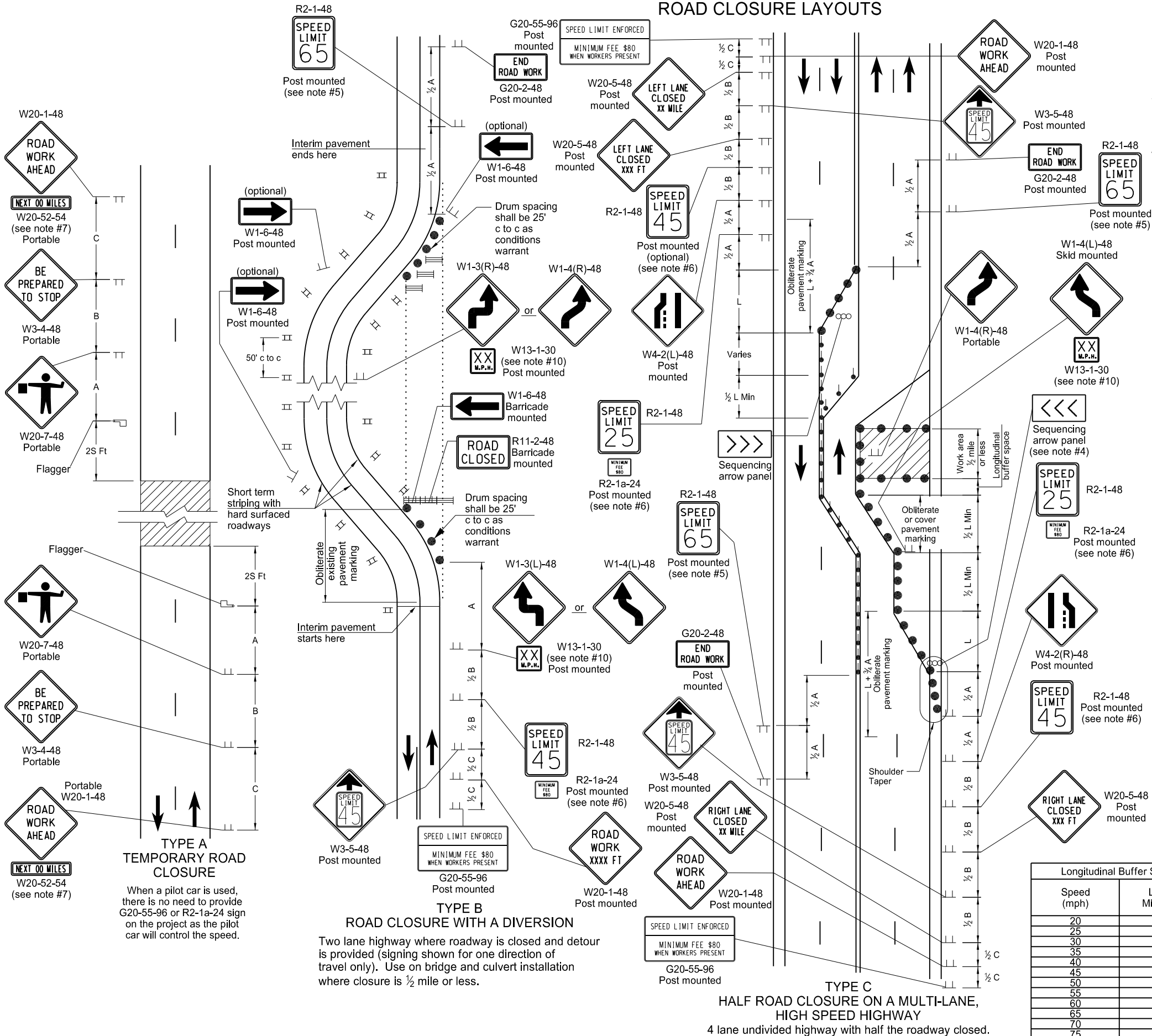
ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1350	2200
Rural Expressway and Freeway (70 mph to 75 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500

KEY	
	Type III barricade
	Sign
	Delineator drum
	Tubular markers
	Work area
	Flagger
	Sequencing arrow panel
	Vertical panels back to back

Longitudinal Buffer Space	
Speed (mph)	Length Min (feet)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

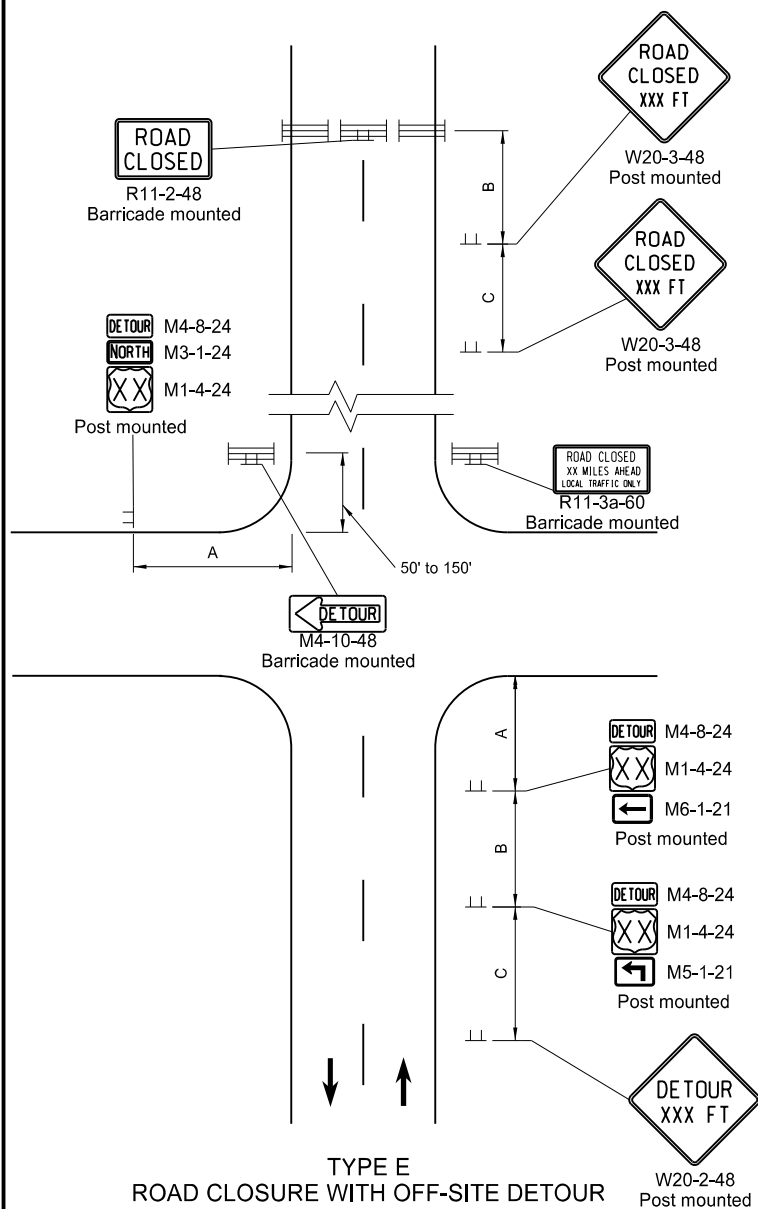
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE

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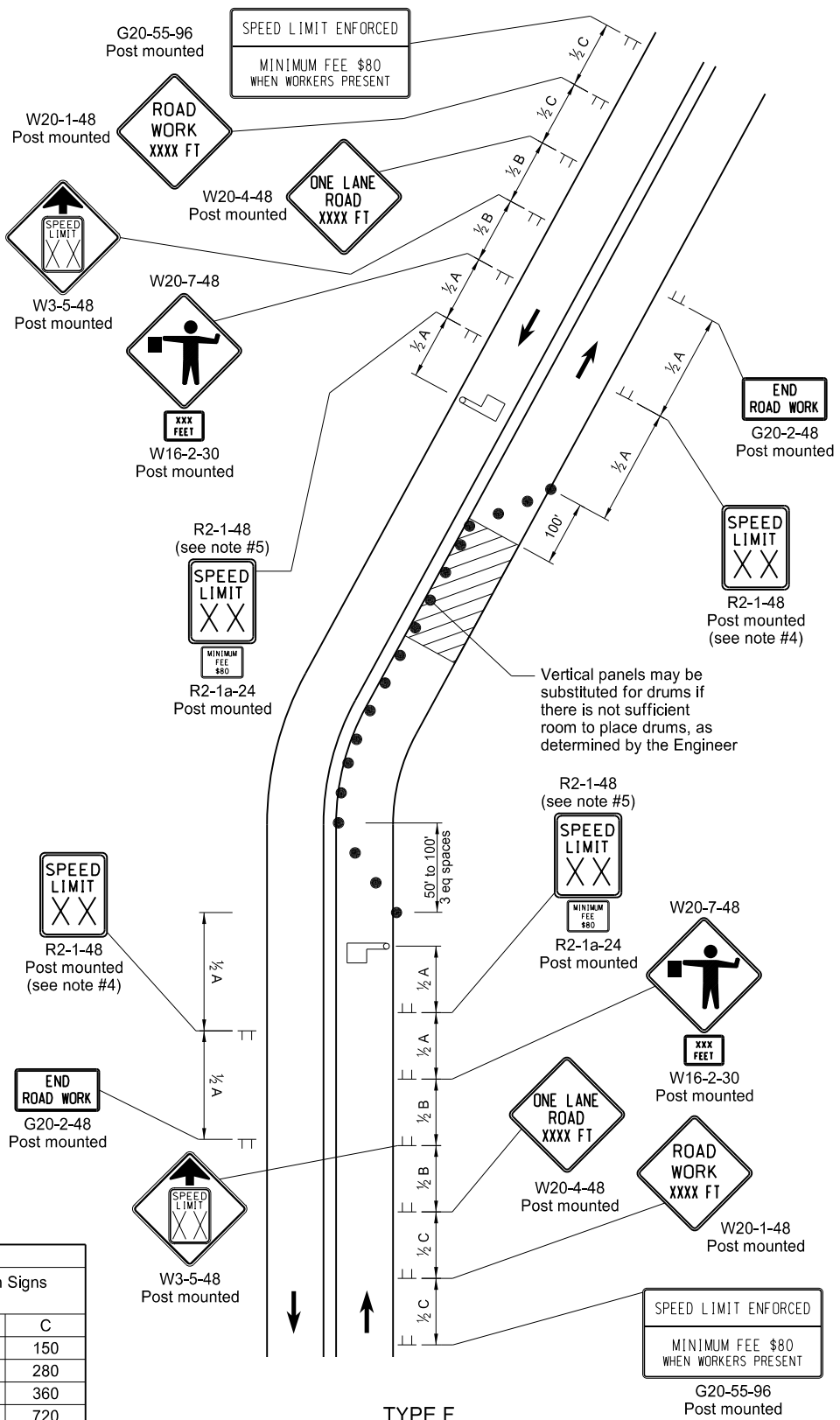
ROAD CLOSURE AND LANE CLOSURE ON A TWO WAY ROAD LAYOUTS

D-704-19



Used where a road is closed beyond a detour point. Signing shown for one direction only. Sign not shown on detour shall be shown in plans and installed and maintained by the contractor.

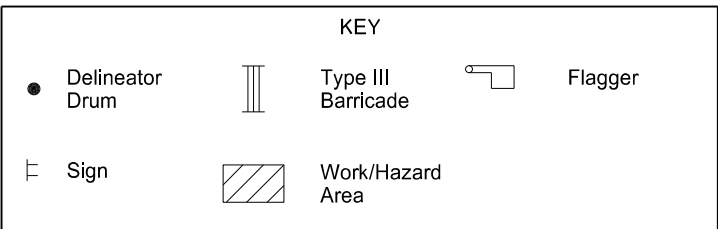
Road Type	ADVANCE WARNING SIGN SPACING		
	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1350	2200
Rural Expressway and Freeway (70 mph to 75 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500



Two lane highway with one lane closed. Flagger is at a point where it is visible to approaching traffic.

Notes

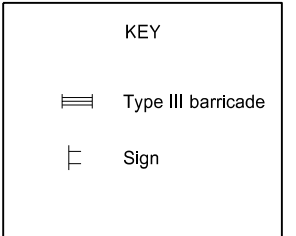
- Variables
S = Numerical value of speed limit or 85th percentile.
W = The width of taper
L = Minimum length of taper, or S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater, or W x S²/60 for urban, residential, and other streets with speeds of 40 mph or less.
- Barricades placed on roadway shall be on a moveable assembly.
- Signs placed on the roadway shall be placed on skid mounted assemblies.
- Delineator drums used for tapering traffic shall be placed at 3 equal spaces.
- The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
- The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
- When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
- Existing speed limit signs within a reduced speed zone shall be covered.
- Where necessary, safe speed to be determined by the Engineer.
- The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
- G20-55-96 or R2-1a-24 sign are not required when a pilot car operation is used, if this standard is part of other traffic control layouts, or the work is less than 15 days.
- When highway-rail grade crossings exist either within or in the vicinity of the roadway work activities:
 - Extra care shall be taken to minimize the probability of conditions being created, either by lane restrictions, flagging or other operations, where vehicles might be stopped within the highway-rail grade crossing (considered as being 15 feet on either side of the closest and farthest rail.)
 - A "Do Not Stop on Tracks" sign (R8-8-24) should be placed near the cross buck in each direction while the lane closure is in the vicinity of the tracks.
 - A buffer space between the work zone and the lane closure transition should be extended upstream of the highway-rail grade crossing so a queue created by the flagging operation will not extend across the highway-rail grade crossing.
 - If the queuing of vehicles across active rail tracks cannot be avoided, a flagger shall be provided at the highway-rail grade crossing to prevent vehicles from stopping within the highway-rail grade crossing, even if automatic warning devices are in place.



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
3-13-14	Revised Sign Cell "ROAD WORK XXX FT"

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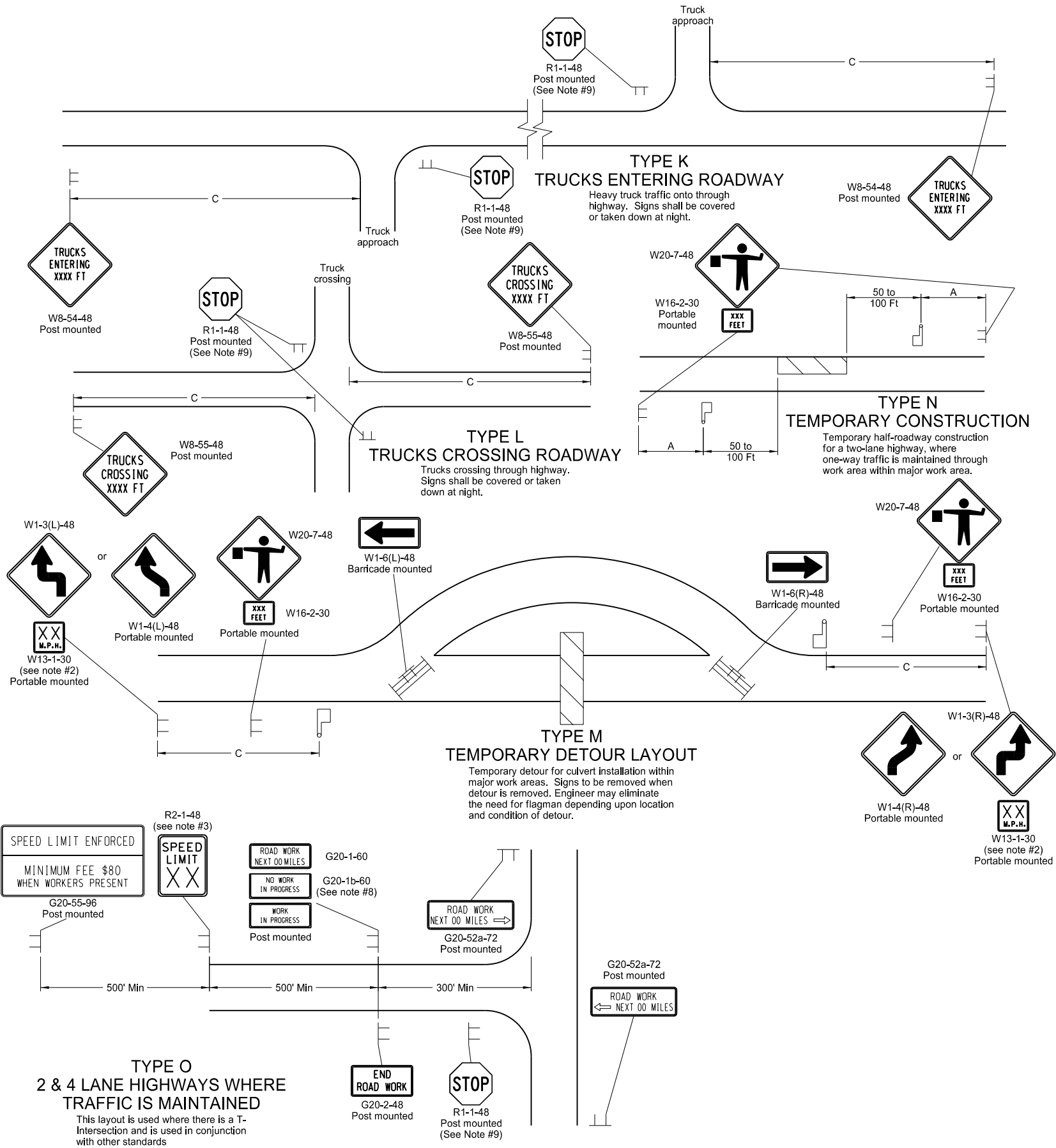
D-704-20



- | ADVANCE WARNING SIGN SPACING | | | |
|--|-------------------------------------|------|------|
| Road Type | Distance Between Signs
Min. (ft) | | |
| | A | B | C |
| Urban - Low Speed (30 mph or less) | 150 | 150 | 150 |
| Urban - Low Speed (over 30 to 40 mph) | 280 | 280 | 280 |
| Urban - High Speed (over 40 mph to 50 mph) | 360 | 360 | 360 |
| Rural - High Speed (over 50 mph to 65 mph) | 720 | 720 | 720 |
| Urban Expressway and Freeway
(55 mph to 60 mph) | 850 | 1350 | 2200 |
| Rural Expressway and Freeway
(70 mph to 75 mph) | 1000 | 1500 | 2640 |
| Interstate/4-Lane Divided
(Maintenance and Surveying) | 750 | 1000 | 1500 |

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of Transportation

CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS



- Notes
1. Barricades placed on roadway shall be on a moveable assembly. Signs placed on the roadway shall be placed on skid mounted assemblies. Where necessary, safe speed to be determined by the Engineer.
 2. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at ½ B.
 3. When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
 4. Existing speed limit signs within a reduced speed zone shall be covered.
 5. Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
 6. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
 7. The contractor shall install the G20-1b-60 sign when work is suspended for winter.
 8. If existing stop sign is in place, a 48" stop sign is not required.
 9. G20-55-96 sign is not required if this standard is part of other traffic control layouts with this sign or the work is less than 15 days.
 - 10.

KEY

Type III barricade Work area

Sign Flagger

ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1350	2200
Rural Expressway and Freeway (70 mph to 75 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE

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SHOULDER CLOSURES AND BRIDGE PAINTING LAYOUTS

D-704-24

- Notes
- Variables
S = Numerical value of speed limit or 85th percentile.
W = The width of the taper.
L = Minimum length of taper, or $S \times W$ for freeways, expressways, and all other roads with speeds of 45 mph or greater, or $W \times S^2 / 60$ for urban, residential, and other streets with speeds of 40 mph or less.
 - Delineator drums used for tapering traffic shall be spaced at dimension "S".
Delineator drums or tubular markers used for tangents shall be spaced at 2 times "S".
 - Sequencing Arrow Panels
Type A shall be used on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
Type B shall be used on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
Type C shall be used on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
 - The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
 - The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at $\frac{1}{2}B$.
 - When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
 - Existing speed limit signs within a reduced speed zone shall be covered.
 - The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.

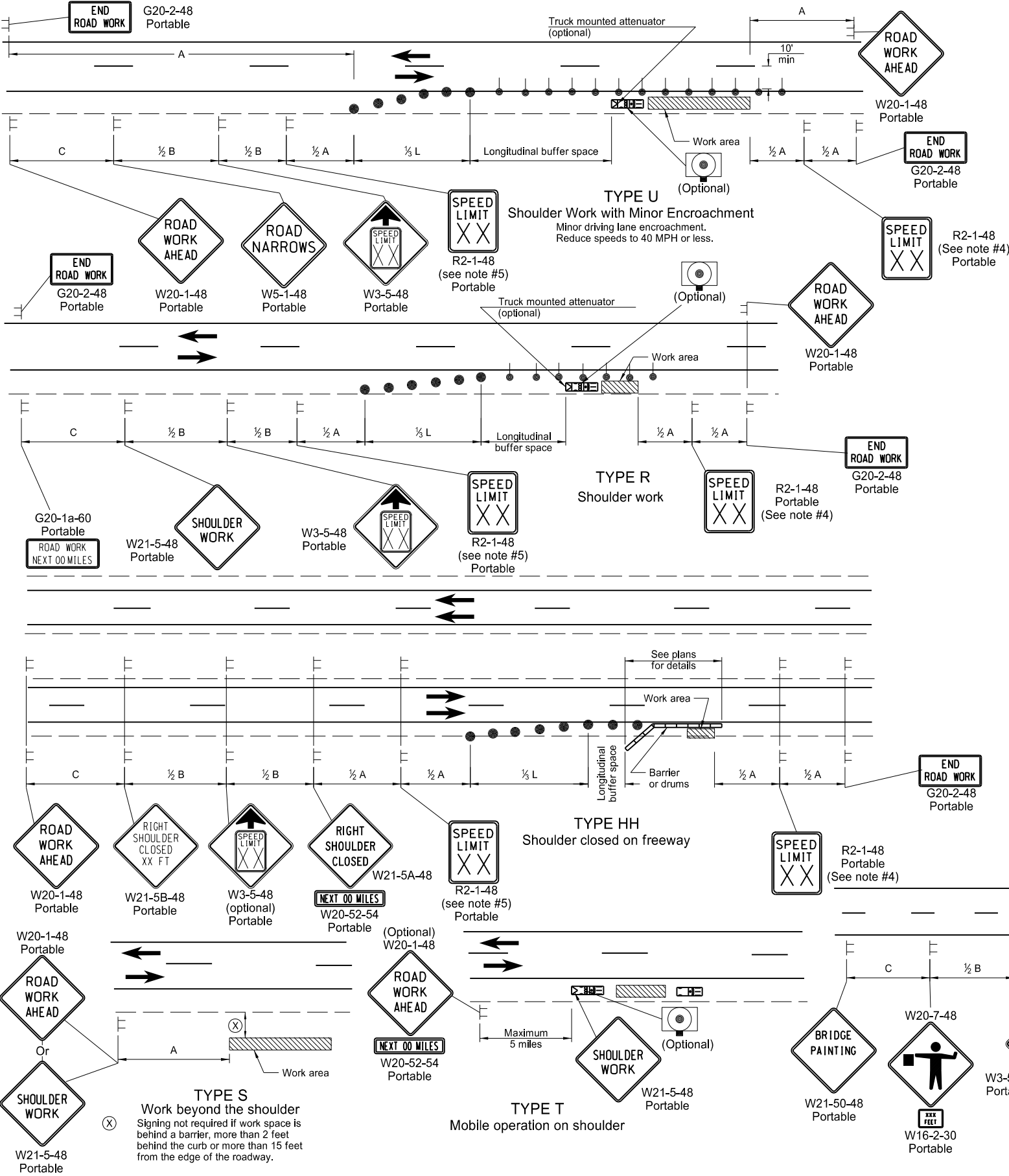
Longitudinal Buffer Space	
Speed (mph)	Length Min (feet)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1350	2200
Rural Expressway and Freeway (70 mph to 75 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500

KEY	
	Sign
	Delineator Drum
	Sequencing Arrow Panel (Caution Mode)
	Work area
	Tubular Marker

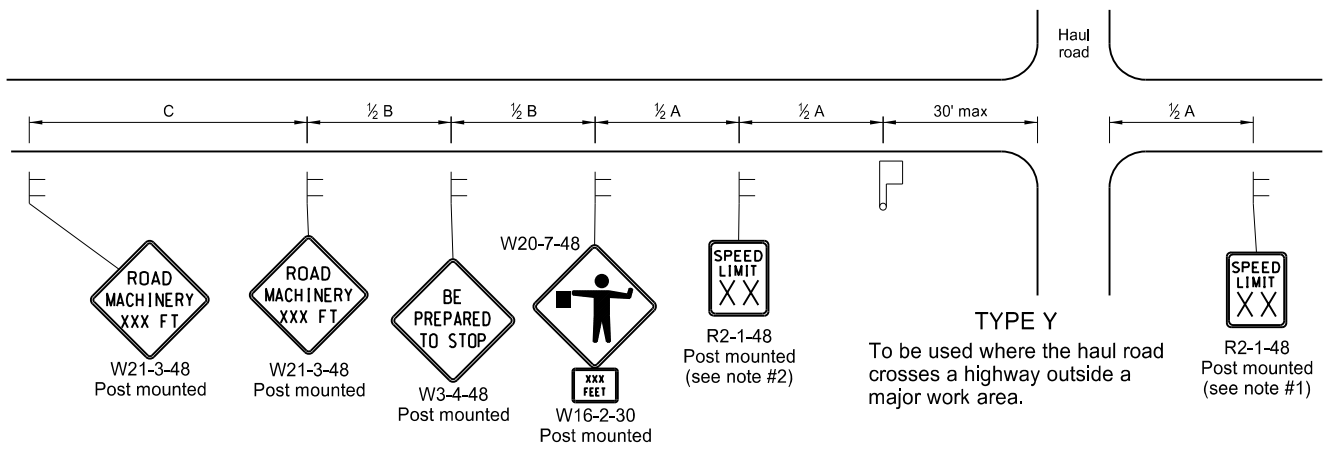
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
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DATE	CHANGE

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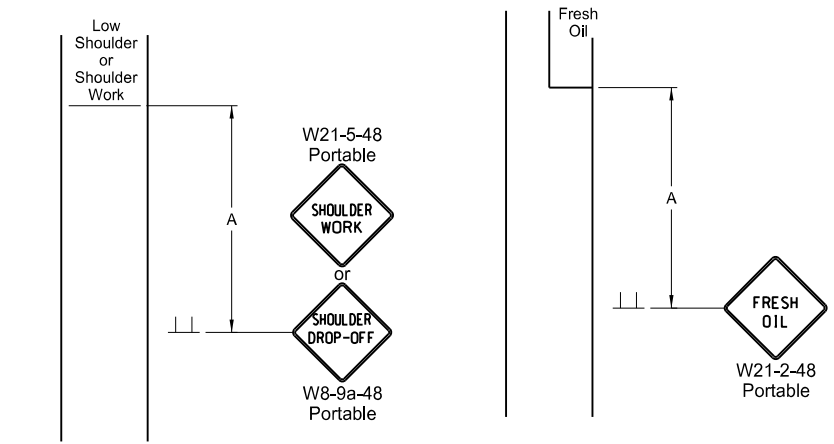
MISCELLANEOUS SIGN LAYOUTS

D-704-26



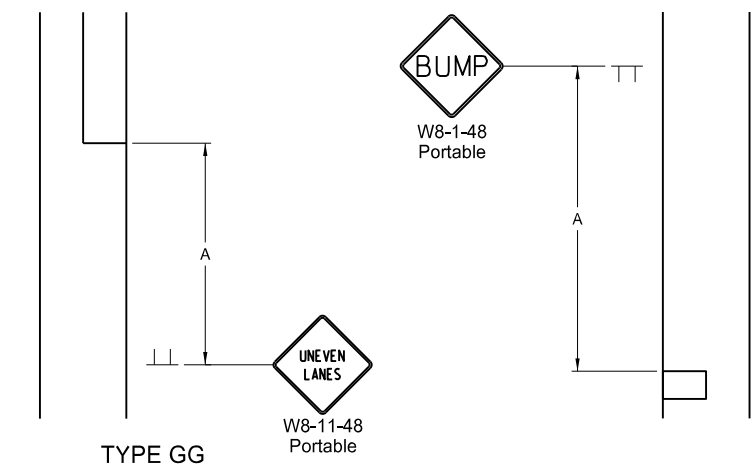
TYPE Y
To be used where the haul road crosses a highway outside a major work area.

R2-1-48
Post mounted
(see note #1)

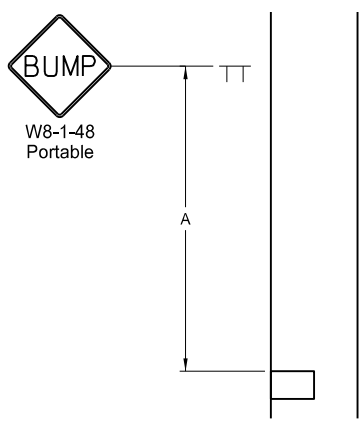


TYPE BB
To be used within a major work area where the sign conditions exist

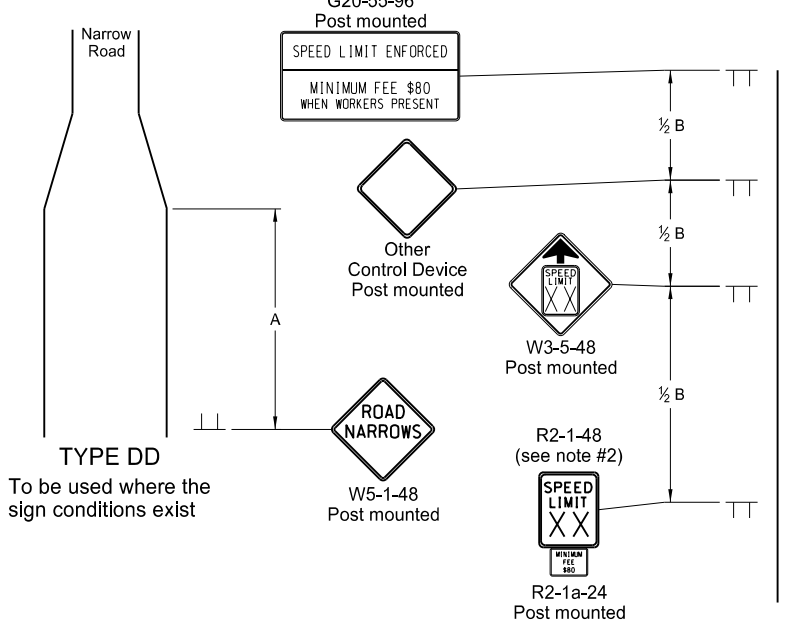
TYPE CC
To be used where the sign conditions exist



TYPE GG
To be used where a difference of elevation between lanes exist



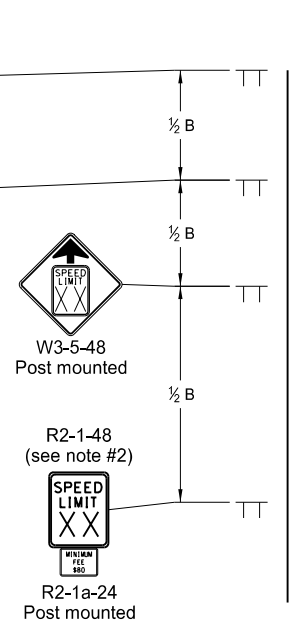
TYPE EE
To be used where the sign conditions exist



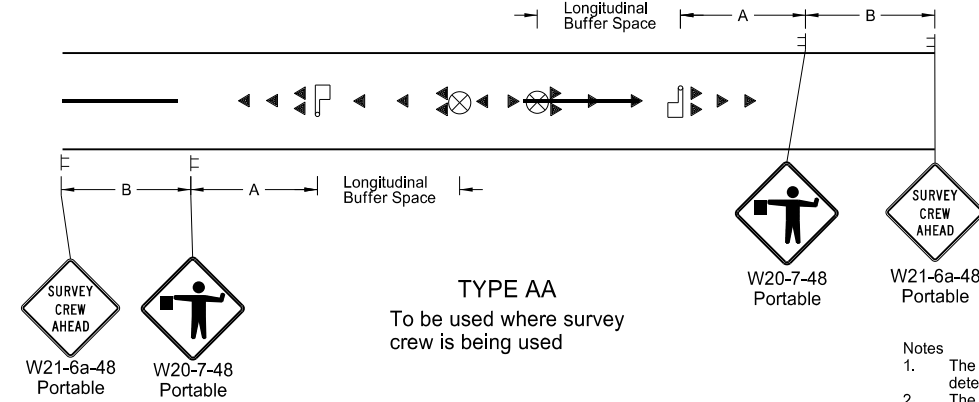
TYPE DD
To be used where the sign conditions exist

W5-1-48
Post mounted

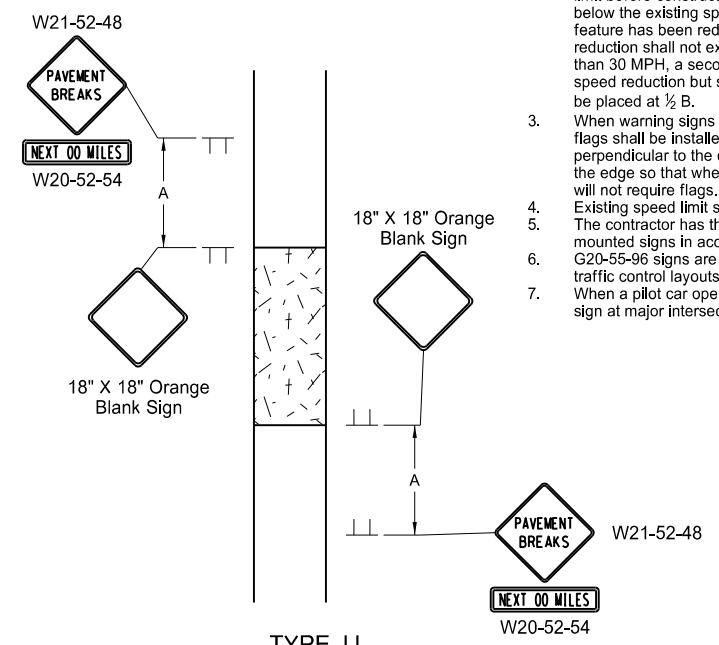
R2-1-48
(see note #2)
R2-1a-24
Post mounted



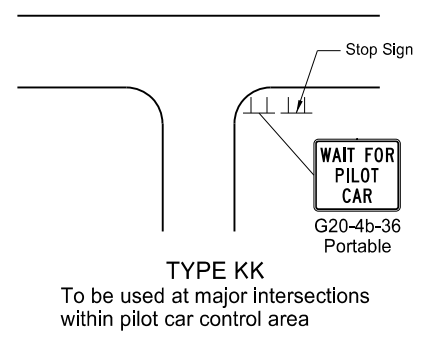
TYPE Z
To be used where speed zone is needed



TYPE AA
To be used where survey crew is being used



TYPE JJ
To be used where there is a break in the pavement. These signs may be skid mounted or post mounted and shall be installed when conditions exist and removed when not applicable.



TYPE KK
To be used at major intersections within pilot car control area

- Notes
1. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
 2. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
 3. When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
 4. Existing speed limit signs within a reduced speed zone shall be covered.
 5. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
 6. G20-55-96 signs are not required if this standard is part of other traffic control layouts, or the work is less than 15 days.
 7. When a pilot car operation is used, place a G20-4b-36 "Wait For Pilot Car" sign at major intersections within pilot car control area.

Longitudinal Buffer Space	
*Speed (mph)	Length Min (feet)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

* Posted speed, off-peak 85th percentile speed prior to work starting, or the anticipated operating speed in mph.

KEY

Sign (represented by a sign symbol)

Cones (represented by a cone symbol)

Flagger (represented by a flagger symbol)

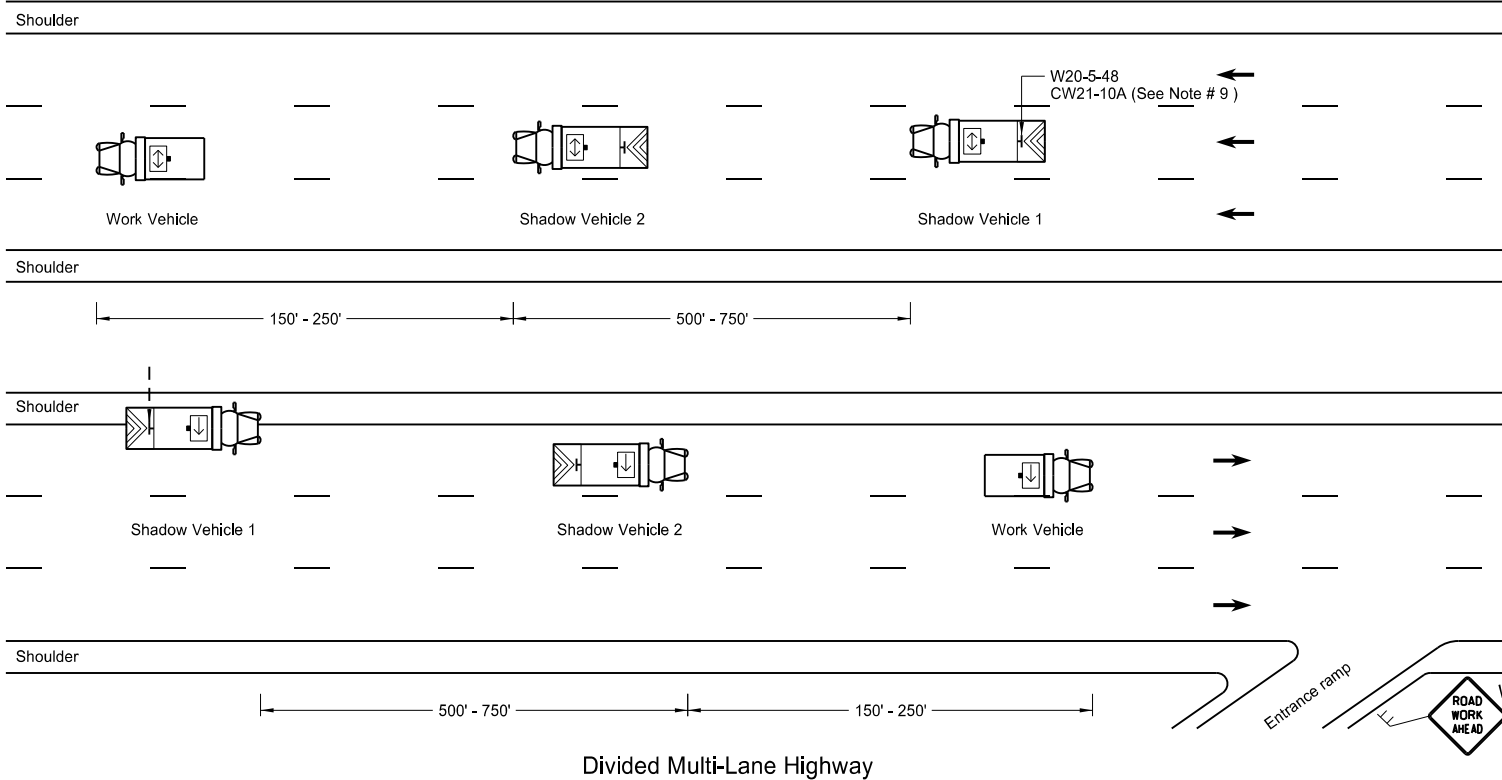
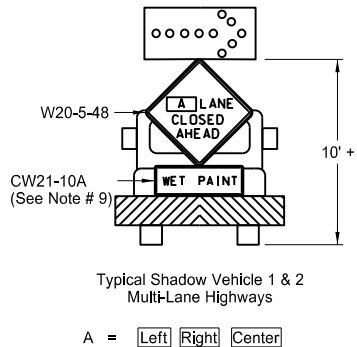
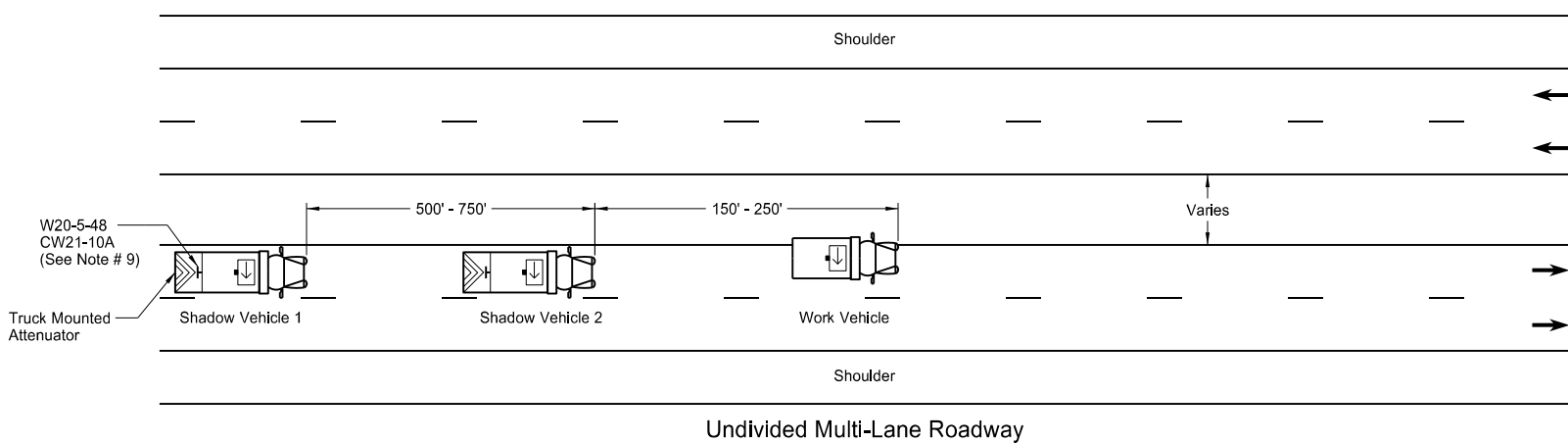
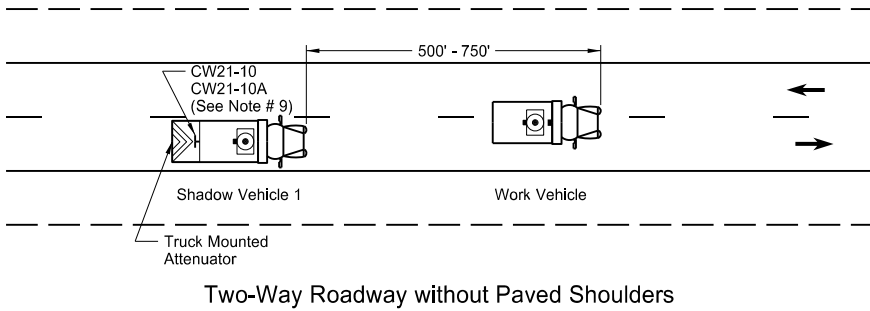
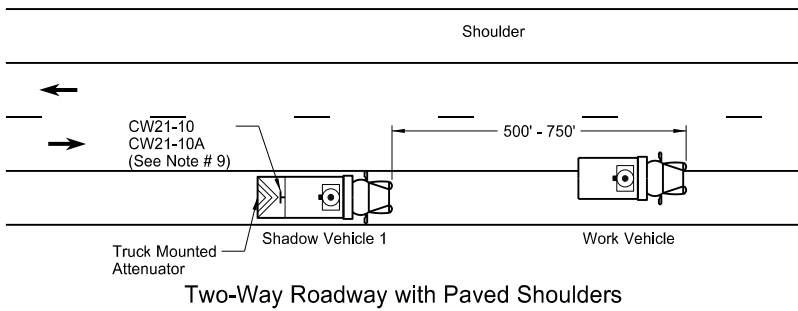
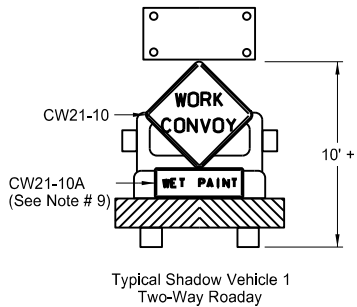
ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1350	2200
Rural Expressway and Freeway (70 mph to 75 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
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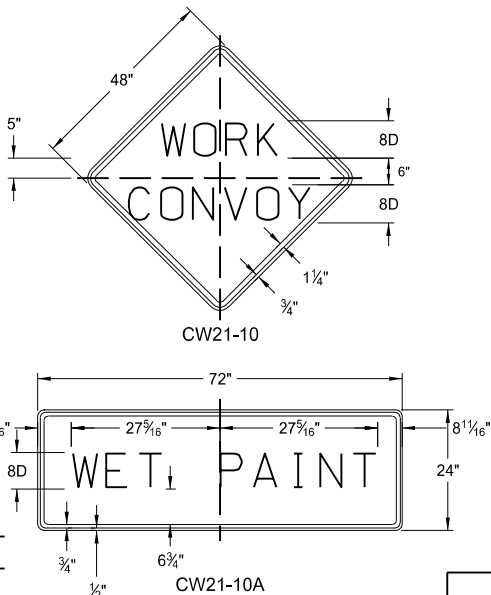
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TRAFFIC CONTROL PLAN FOR MOVING OPERATIONS

D-704-27



Sign Details



Notes

1. If the contractor chooses to place more vehicles in the convoy than are shown, these vehicles shall have the truck mounted attenuator and shall be at the contractor's expense.
2. Shadow and work vehicles shall display yellow rotating beacons or strobe lights unless otherwise stated elsewhere in the plans.
3. Flashing arrow panels shall be Type B or Type C. The panel operation shall be controlled from inside the vehicle.
4. Each vehicle shall have two-way electronic communication capability.
5. When work convoys must change lanes, shadow vehicle 1 should change lanes first to shadow other convoy vehicles.
6. Vehicle spacing between the shadow vehicle 1 and shadow vehicle 2 will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the trail vehicle in time to slow down and/or change lanes as they approach the shadow vehicle.
7. Sign Colors
Letters = Black
Border = Black
Background = Orange
8. Shadow vehicle 2 may be used as the paint tender vehicle.
9. Sign CW21-10A shall only be used during a painting operation.
10. On two lane - two way roadways, the work and shadow vehicles should pull over periodically to allow motor vehicle traffic to pass.

KEY

- Sign
- Truck mounted attenuator
- Flashing arrow panels:
- Right directional
 - Left directional
 - Double arrow directional
 - Caution Mode

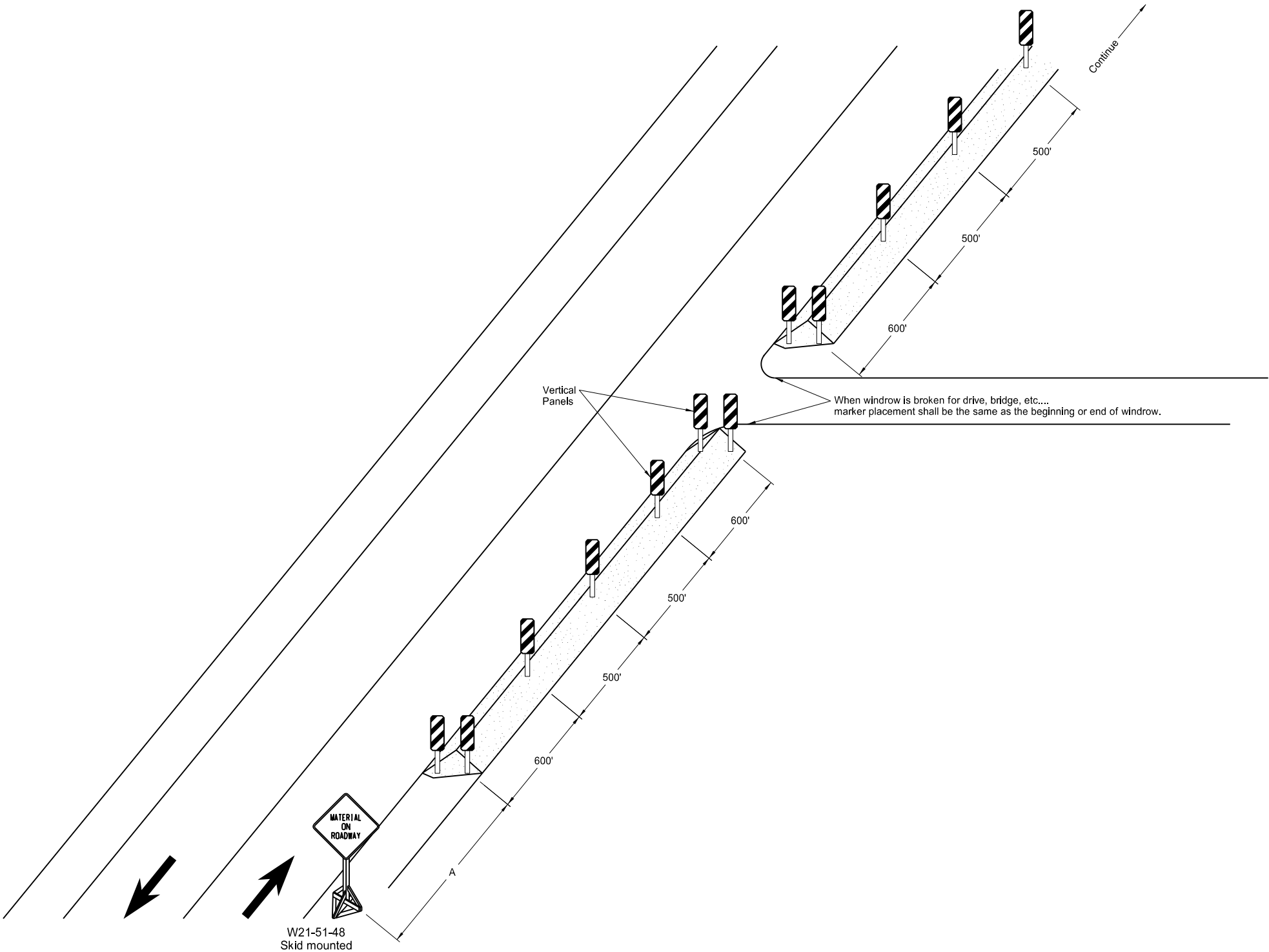
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
6-18-14	Removed shadow vehicle 2 on two lane roadways

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WINDROW MARKING

D-704-30

Notes:
The contractor has the option of using portable sign supports in lieu of post mounted sign in accordance with the NDDOT Standard Specifications.



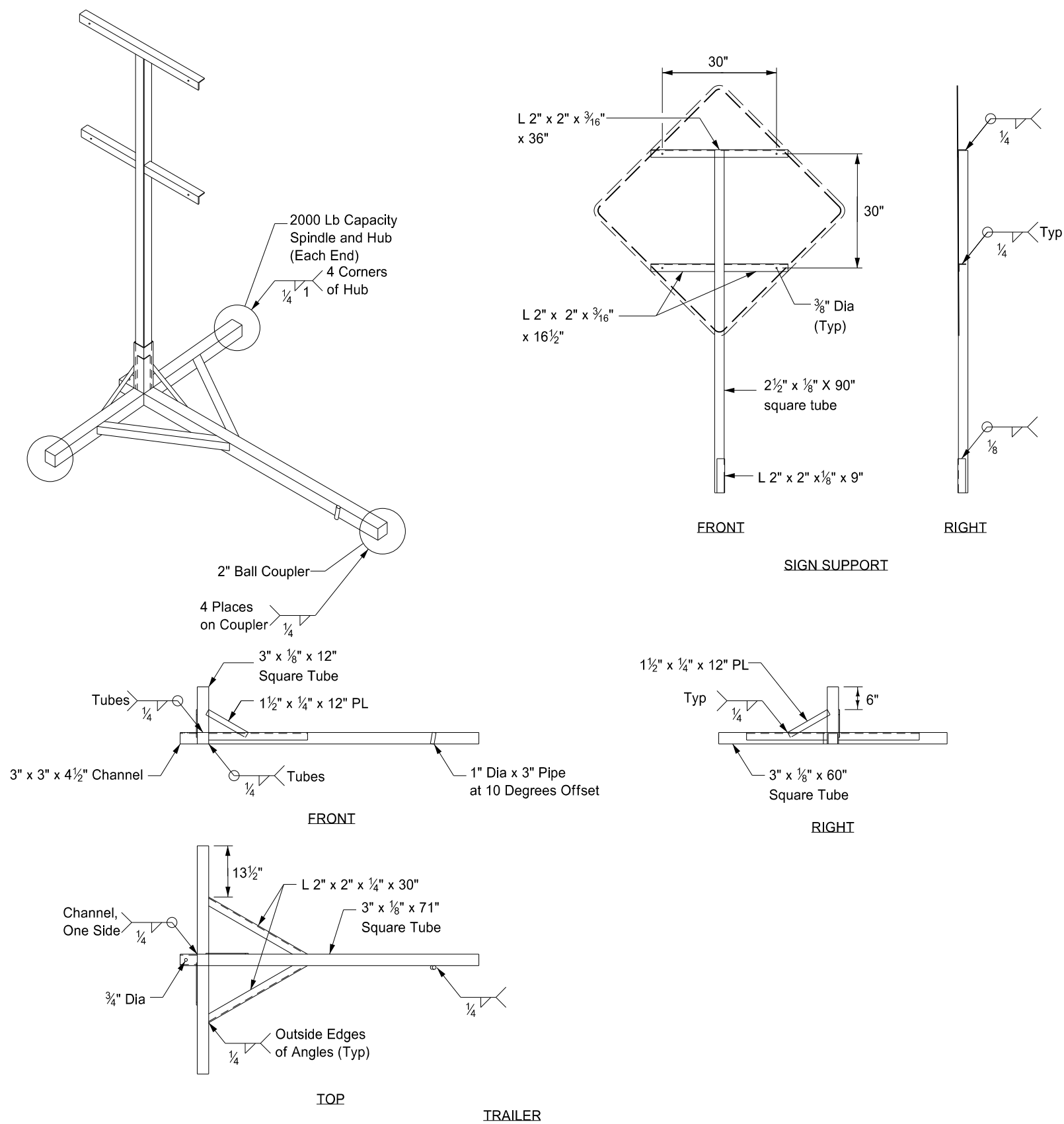
ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1350	2200
Rural Expressway and Freeway (55 mph to 60 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
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DATE	CHANGE
6-24-14	Revised Note

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PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



Notes:

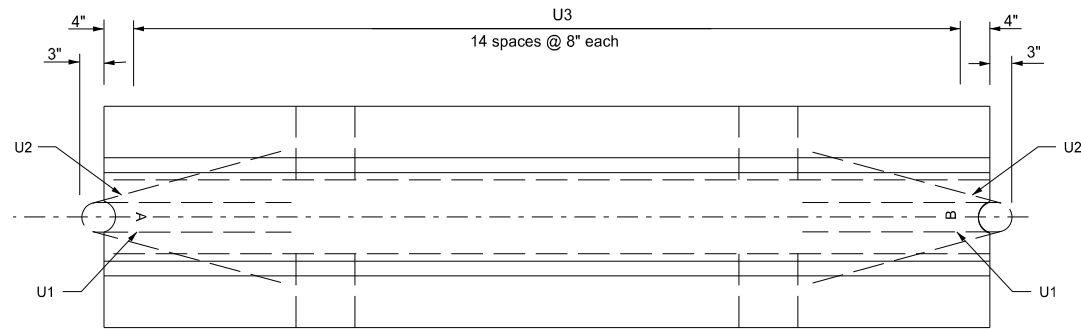
- ① The maximum weight of the assembly is 250 pounds.
- ② Use a 14" wheel and tire.
- ③ Automotive and equipment axle assemblies may not be used for trailer-mounted sign supports.
- ④ Other NCHRP 350 crash tested assemblies are acceptable.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-23-10	
REVISIONS	
DATE	CHANGE

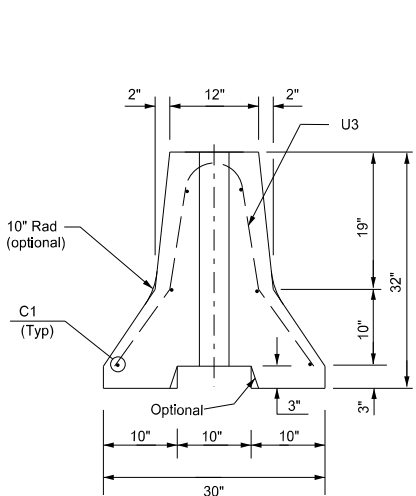
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PORTABLE PRECAST CONCRETE MEDIAN BARRIER
(TEMPORARY USAGE)

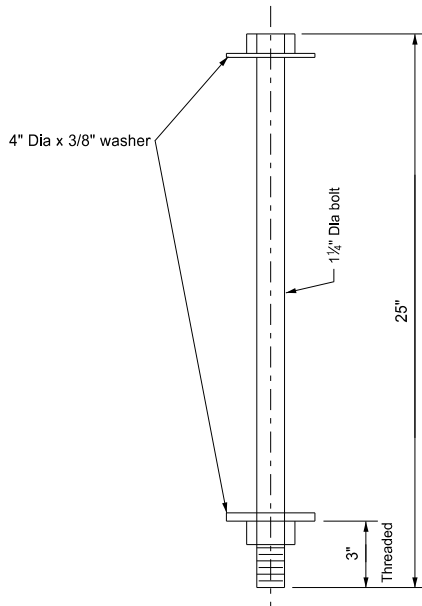
D-704-51



Plan View

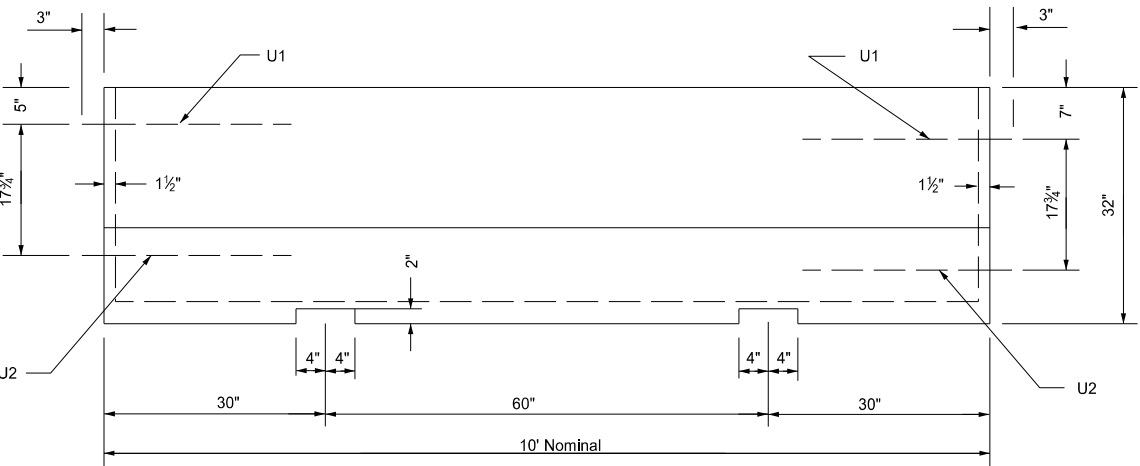


End View

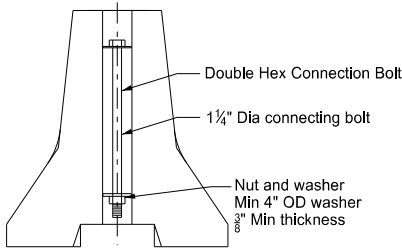


Connecting Bolt Detail

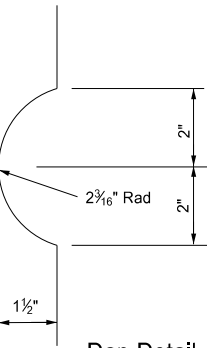
(One per 10 Ft section)



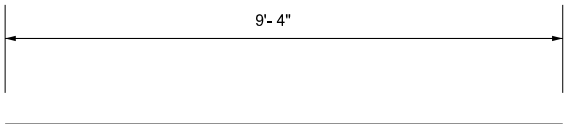
Side View



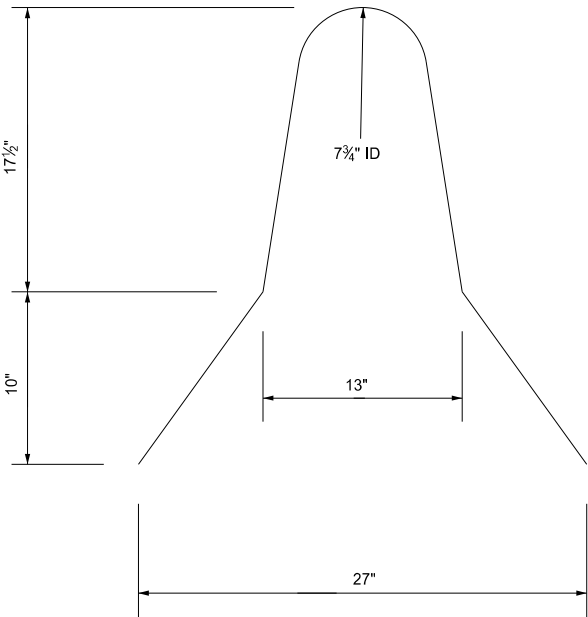
Bolt Connection Detail



Dap Detail



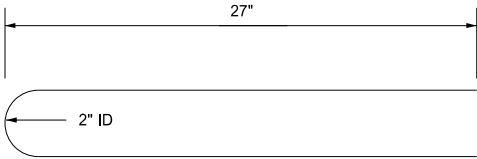
C1 Bar Detail



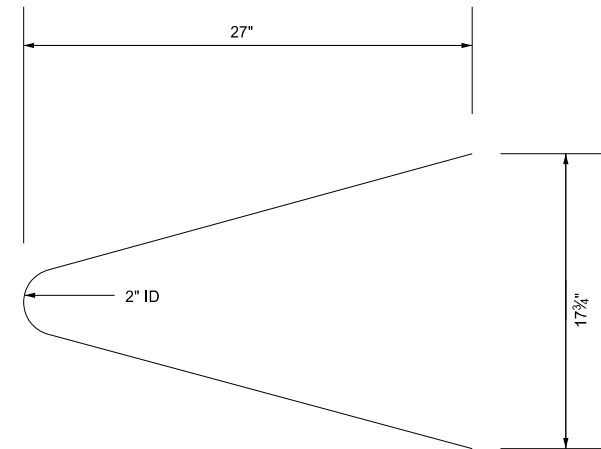
U3 Bar Detail

Notes:

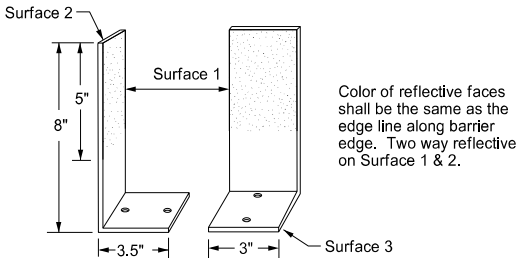
1. All exposed hardware shall be galvanized as per ASTM A153, except for the loop inserts.
2. Concrete shall be Class AAE-3.
3. All steel shall conform to Section 612 of the NDDOT Standard Specifications.
4. Barrier ends shall be imprinted A and B as shown with 4 inch letters. Field placement shall match the A end with the B end.
5. Barrier markers shall be placed at the center of the barrier at 20' centers.
6. Barrier sections shall be connected together with the 1 1/4" Dia A-307 double hex connecting bolt. The bottom nut and washer connection shall be maintained by the contractor for the duration of the barrier installation.
7. Barrier shall be placed such that openings between individual sections shall be kept to a minimum.



U1 Bar Detail



U2 Bar Detail



Barrier Marker Detail

Color of reflective faces shall be the same as the edge line along barrier edge. Two way reflective on Surface 1 & 2.

Reflective Tape

The reflector shall be a retroreflective, acrylic microprism material with acrylic backing, 3" wide, providing the following minimum optical performance with an observation angle of 0.1' measured in candlepower:

Entrance Angle	Specific Intensity
Yellow - 4"	136
White - 4"	200

Adhesive

Markers shall be temporarily mounted to the portable concrete barrier with factory applied solid butyl rubber 1/8" thick, 2" wide on 2 1/4" wide release paper on surface 3.

Bar List				
Mark	Size	No.	Length	Shape
C1	4	6	9'- 4"	Straight
U1	4	2	4'- 8"	Bent
U2	4	2	4'- 10 1/4"	Bent
U3	4	15	5'- 4"	Bent

Marker Body
The marker shall be made of a high impact, weatherable engineering thermo-plastic material which conforms to the following:

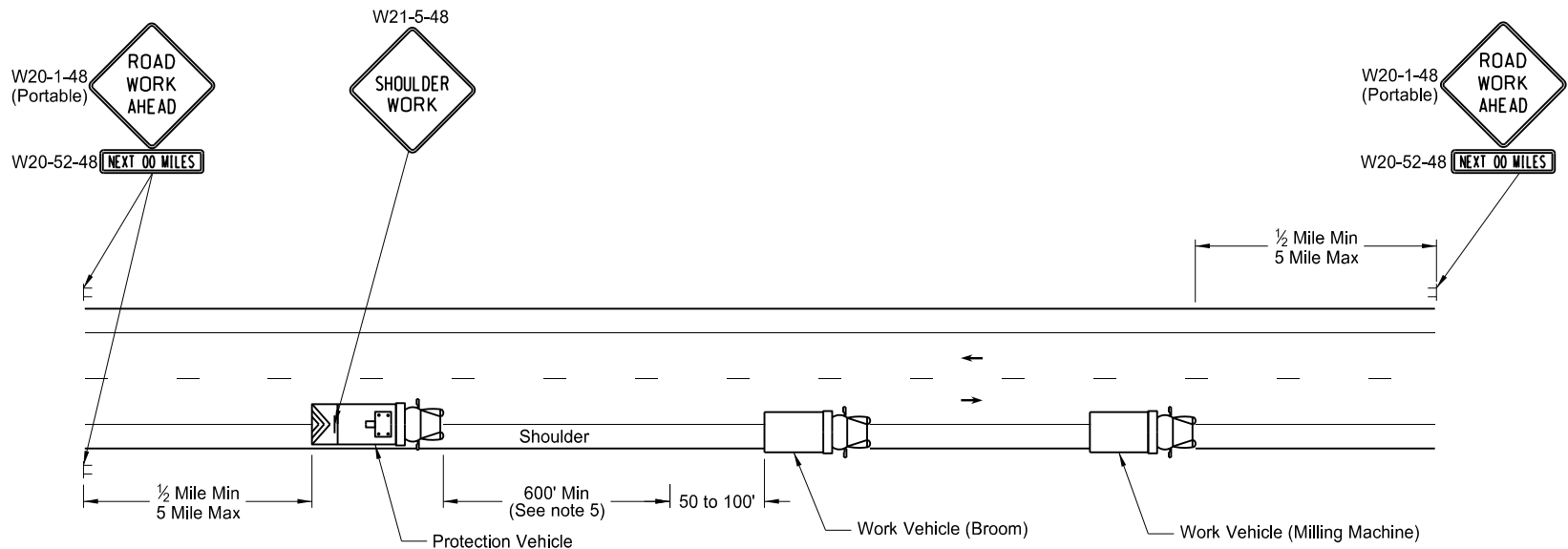
Property	Result	ASTM Test Method
Thickness (min)	.090"	—
Tensile strength (min psi) @ yield	5,500	D638
Impact strength @ -20°F (ft-lbs/in of notch)	3.2	D256 Method A
Impact strength @ 73°F (ft-lbs/in of notch)	14.0	D256 Method A
Flexural strength, PSI 1/4" @ 73°F	8,000	D790
Flexural modulus, PSI 1/4" @ 73°F	300,000	D790
Elongation @ yield	30%	D638

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-20-12	
REVISIONS	
DATE	CHANGE

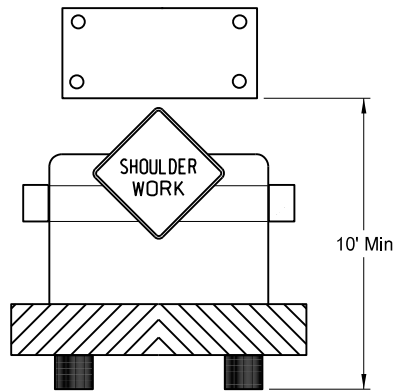
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MOBILE OPERATION
Grinding Shoulder Rumble Strips

D-704-56

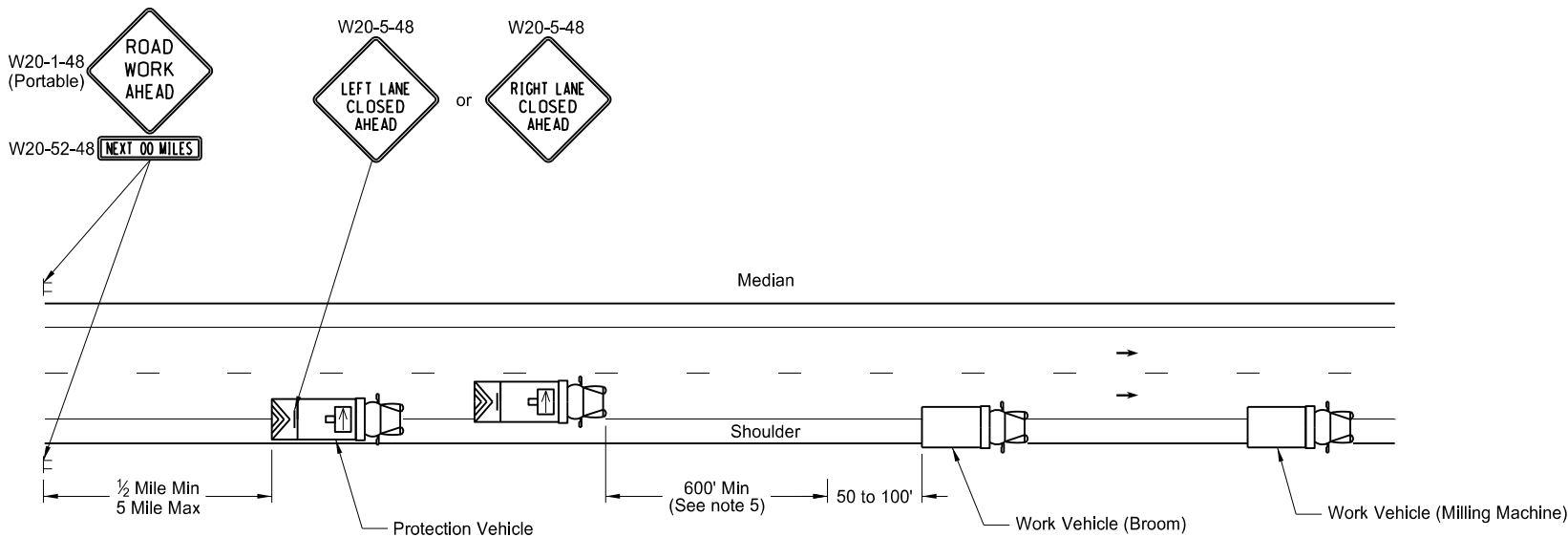


TWO LANE - TWO WAY ROADWAY

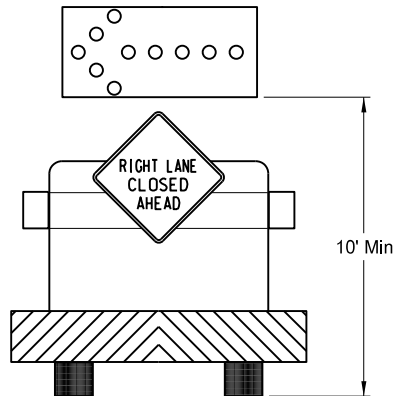


TWO LANE - TWO WAY ROADWAY
Typical Protection Vehicle with
Flashing Arrow Panel In Caution Mode

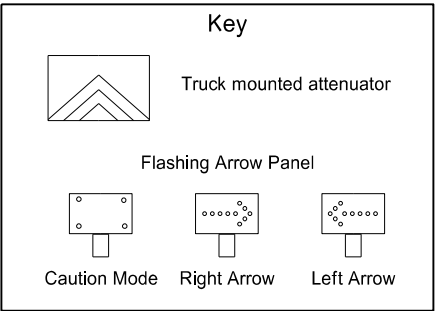
- Notes:
1. If the contractor chooses to place more vehicles in the convoy than are shown, these vehicles shall have the truck mounted attenuator and shall be at the contractors expense.
 2. Vehicles shall have a rotating, flashing, oscillating or strobe lights.
 3. Flashing arrow panels shall be Type B or Type C. The panel operation shall be controlled from inside the vehicle.
 4. Each vehicle shall have two - way electronic communication capability.
 5. Vehicle spacing between the protection vehicle and work vehicle will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the protection vehicle in time to slow down and safely pass the work vehicles.
 6. ROAD WORK AHEAD SIGN: Advance Road Work Ahead signs shall be moved as the work area moves through the construction zone.
 7. Next XX Miles sign required when the distance from Road Work Ahead sign to the work location is two miles or greater.



INTERSTATE & 4 LANE DIVIDED HIGHWAY



INTERSTATE & 4 LANE DIVIDED HIGHWAY
Typical Protection Vehicle with Flashing Arrow
Panel In Flashing Arrow Mode

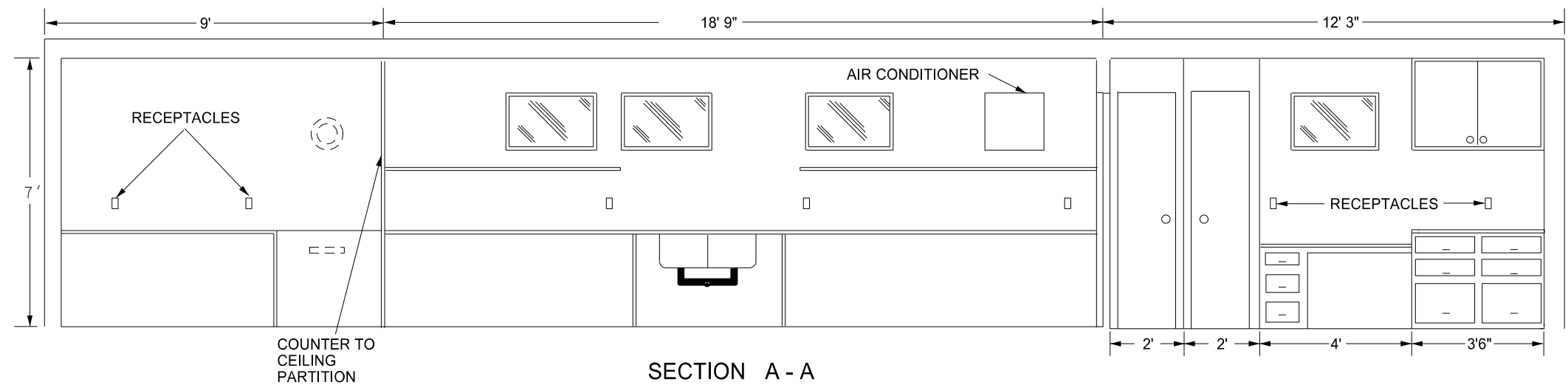
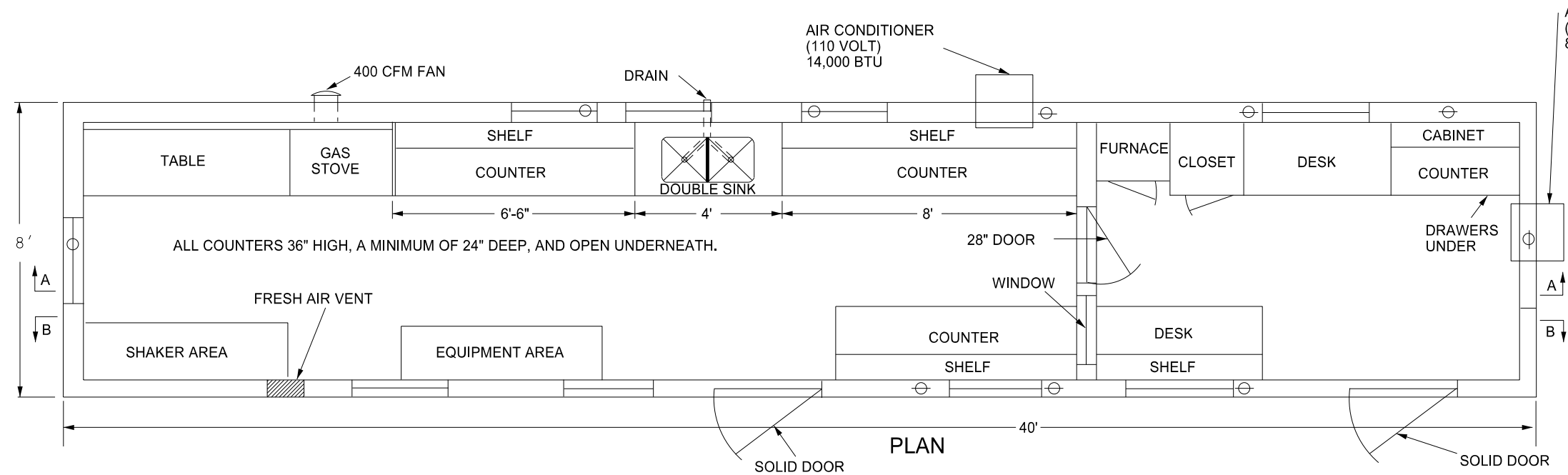


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-15-12	
REVISIONS	
DATE	CHANGE

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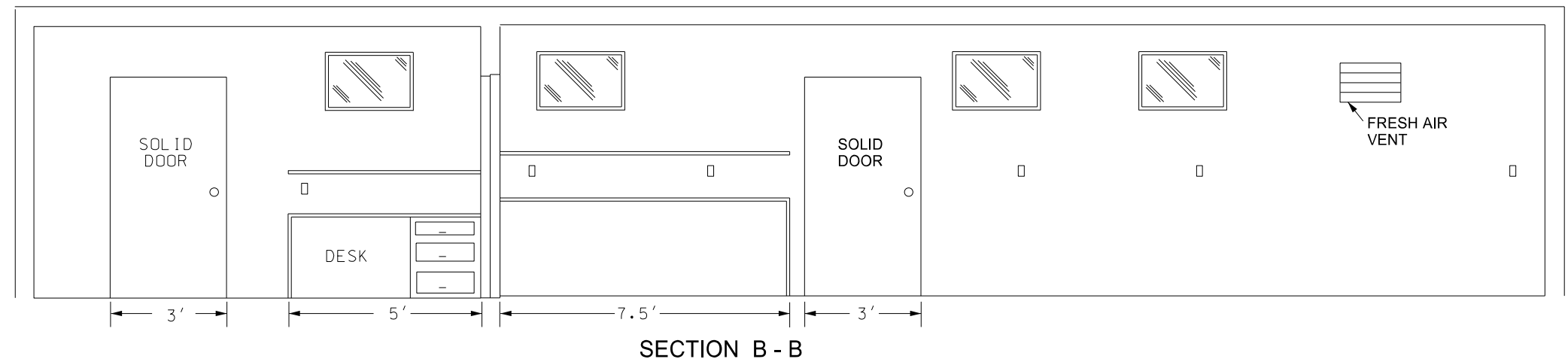
BITUMINOUS LABORATORY

D-706-1



Provide a laboratory with the following:

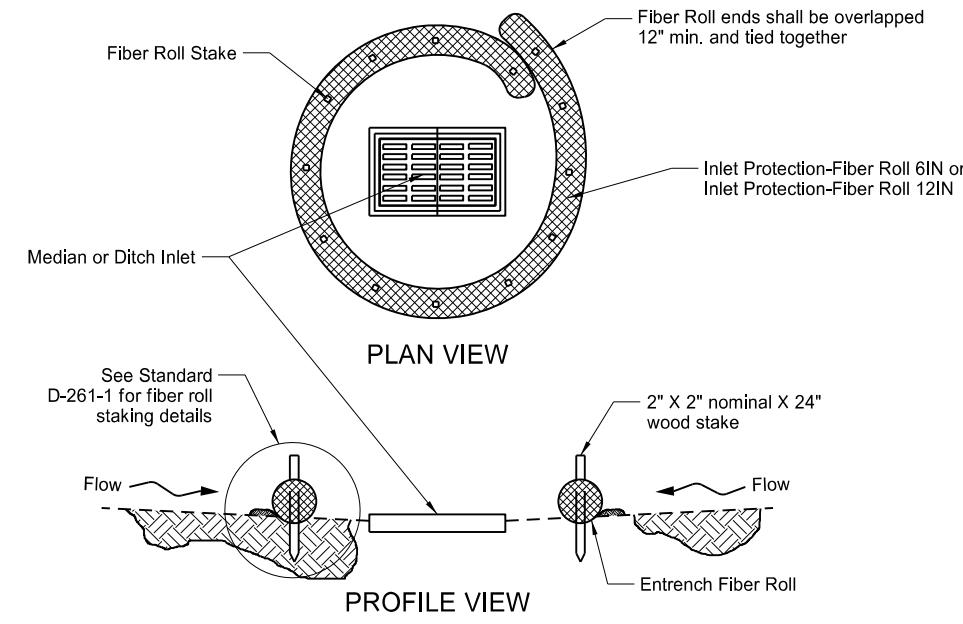
1. A 1'x1' shelf at 36" above the regular countertop.
2. Double compartment stainless steel sink, with each compartment a minimum of 16"x14"x10" deep. Provide water service lines made of copper or plastic and a diameter of ½ inch.
3. An exhaust fan capable of removing inside air at a rate of 400 CFM.
4. Fresh air vent hinged to open or close manually.
5. 24" x 48" table capable of holding a 200 lb masonry saw with a minimum clearance of 36" above the table.
6. A water supply tank with a capacity of 500 gallons and a 20 gallon capacity pressure tank on the pump.
7. Heavy duty type locks, latches, and hinges for doors made to withstand the intense use in service.
8. A wall between the office and the work area properly insulated to prevent the transmission of heat and noise.
9. The steel cable tie downs and ground anchors at each corner of the lab.
10. Electrical service entrance wired for 100 amps and separate circuits for air conditioners. Space convenience outlets in counter areas a minimum of four feet apart.



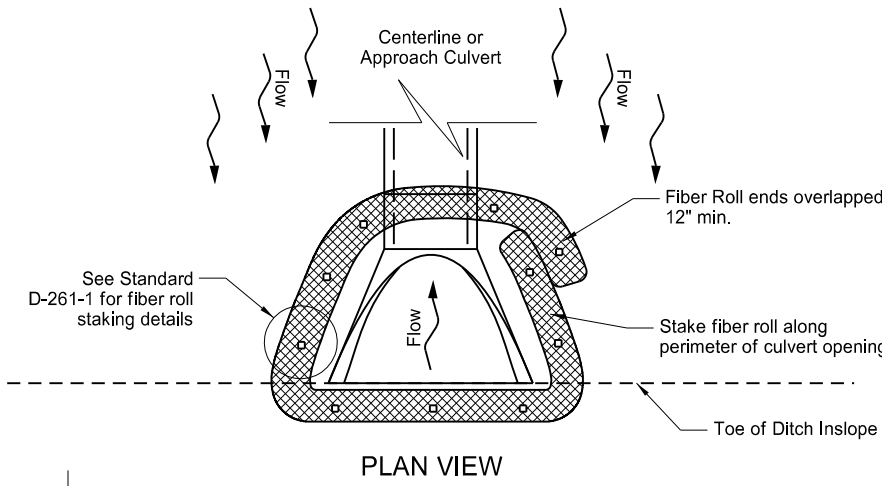
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
07-30-14	Changed standard's title and revised notes.
01-11-16	Revised notes.

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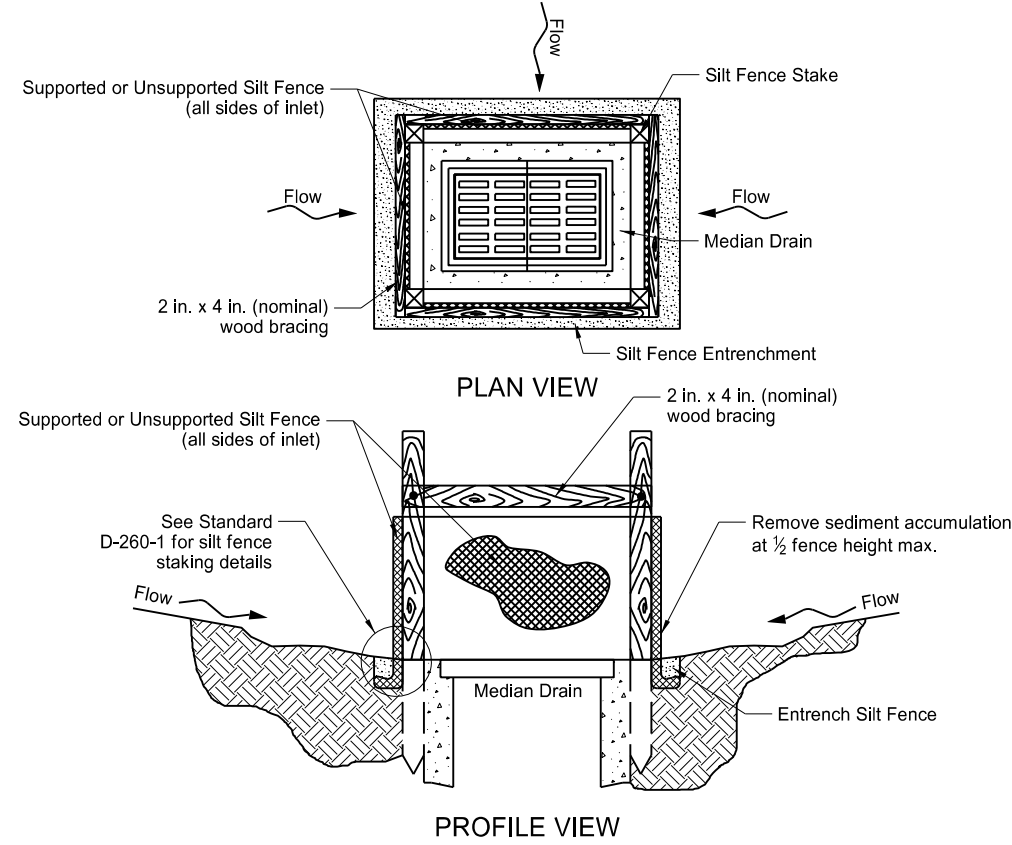
EROSION AND SILTATION CONTROLS
MEDIAN OR DITCH INLET PROTECTION



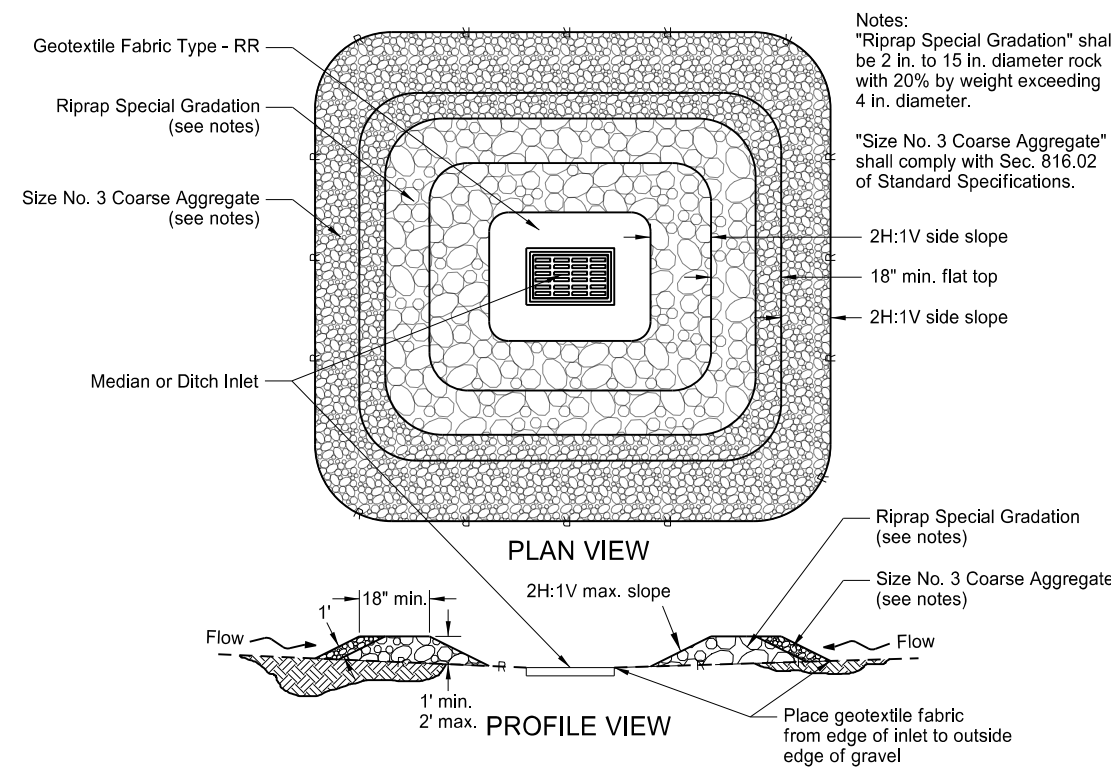
FIBER ROLL PROTECTION
(MEDIAN OR DITCH INLET)



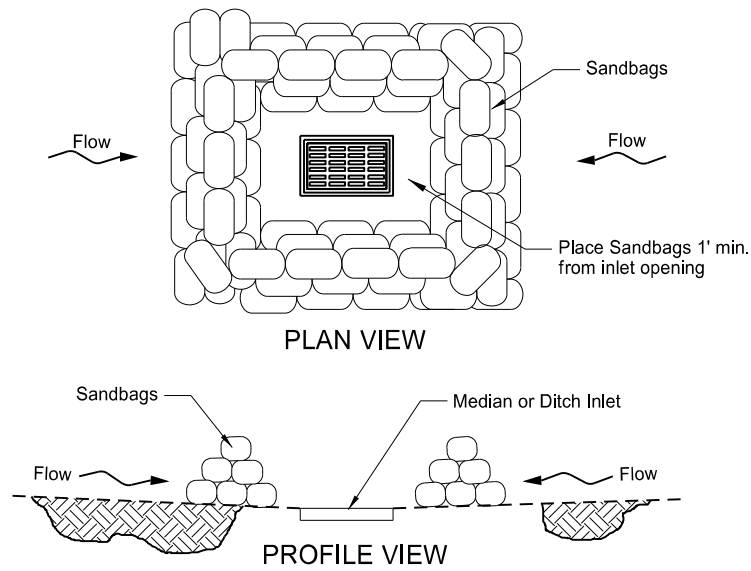
FIBER ROLL PROTECTION
(INLET OF CULVERT)



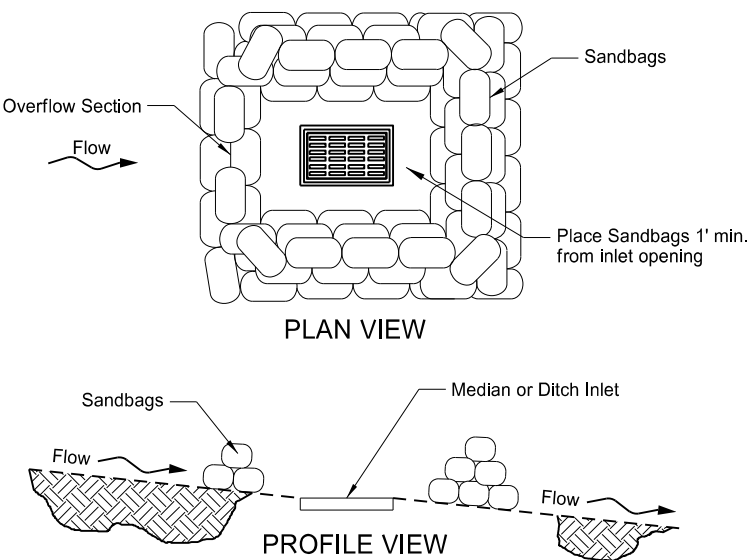
SILT FENCE PROTECTION
(MEDIAN OR DITCH INLET)



GRAVEL INLET PROTECTION
(MEDIAN OR DITCH INLET)



SANDBAG PROTECTION
(LOW POINT)

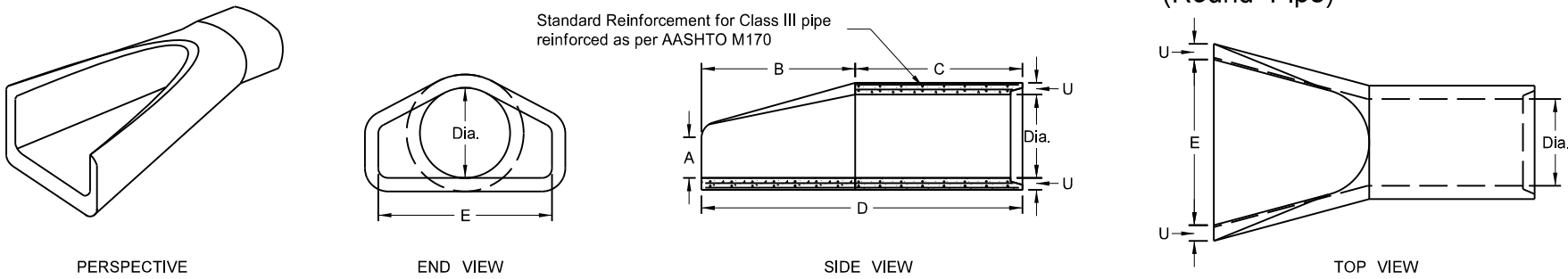


SANDBAG PROTECTION
(ON SLOPE)

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
06-26-14	Updated reference to standard drawing number for fiber roll staking details.
10-01-14	Updated reference to standard drawing number for silt fence.

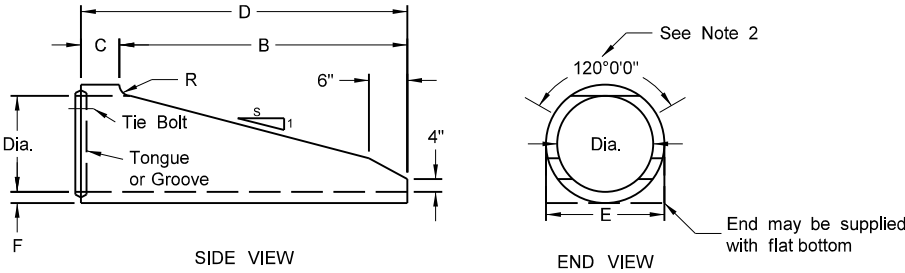
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REINFORCED CONCRETE PIPE CULVERTS AND END SECTIONS
(Round Pipe)



REINFORCED CONCRETE PIPE - FLARED END SECTION
Reinforcement to be equivalent to Class III RCP

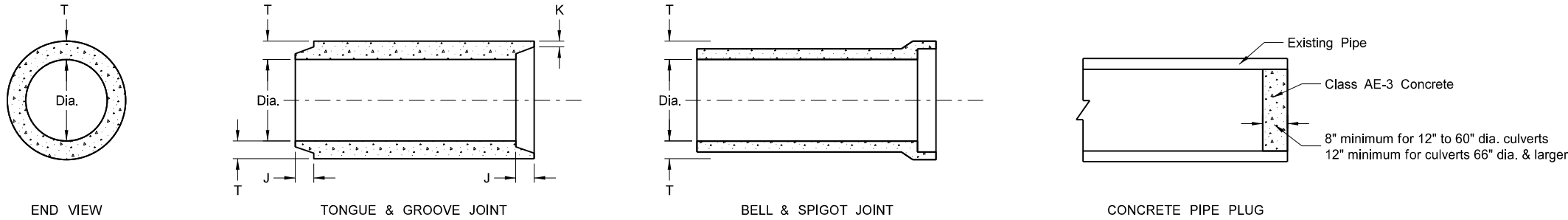
TRAVERSABLE END SECTION							
DIA	B	C	D	E	F	R	S
15"	4"	9"	4'-9"	1'-7½"	2½"	3"	6
18"	5'-9"	9"	6'-6"	1'-11"	2½"	3"	6
24"	6"	1'	7"	2'-6"	3"	3"	4
30"	7'-6"	1'	8'-6"	3'-1"	3½"	3½"	4
36"	7'-3"	15"	8'-6"	3'-8"	4"	3"	4



- NOTES (Traversable End Section):
- Manufactured in accordance with applicable portions of ASTM C76/AASHTO M170.
 - Reinforcement per Class III RCP with double reinforcement in the upper 120° of the full barrel portion.

FLARED END SECTION						
TERMINAL DIMENSIONS						
DIA	A	B	C	D	E	U
12	0'-4"	2'-0"	4'-0⅞"	6'-0⅞"	2'-0"	2"
15	0'-6"	2'-3"	3'-10"	6'-1"	2'-6"	2½"
18	0'-9"	2'-3"	3'-10"	6'-1"	3'-0"	2½"
21	0'-9"	3'-0"	3'-1"	6'-1"	3'-6"	2½"
24	0'-9½"	3'-7½"	2'-6"	6'-1½"	4'-0"	3"
27	0'-10½"	4'-0"	2'-1½"	6'-1½"	4'-6"	3½"
30	1'-0"	4'-6"	1'-7¾"	6'-1¾"	5'-0"	3½"
36	1'-3"	5'-3"	2'-9"	8'-0"	6'-0"	4"
42	1'-9"	5'-3"	2'-9"	8'-0"	6'-6"	4½"
48	2'-0"	6'-0"	2'-0"	8'-0"	7'-0"	5"
54	2'-3"	5'-5"	2'-9¼"	8'-2¼"	7'-6"	5½"
60	2'-11"	5'-0"	3'-3"	8'-3"	8'-0"	5"
66	2'-6"	6'-0"	2'-3"	8'-3"	8'-6"	5½"
72	3'-0"	6'-6"	1'-9"	8'-3"	9'-0"	6"
78	3'-0"	7'-6"	1'-9"	9'-3"	9'-6"	6½"
84	3'-0"	7'-6½"	1'-9"	9'-3½"	10'-0"	6½"
90	3'-5"	7'-3½"	2'-0"	9'-3½"	11'-0"	6½"

REINFORCED CONCRETE PIPE - TRAVERSABLE END SECTION
Reinforcement to be equivalent to Class III RCP



All Classifications of Round Concrete Pipe						
Internal Dia. of Pipe in Inches	Cross-Sectional Water Area	Weight per Lin. Foot of Pipe Std. Wall	Joint J Groove End Min./Max.	Joint K Tongue Min.	Minimum Wall Thickness (T)	
Dia	Sq. ft.	Lbs.	In.	In.	In.	
12	0.79	92	1⅝-2⅝	¾	2	
15	1.23	127	1¾-2¾	⅞	2½	
18	1.77	168	1⅝-2⅝	1	2½	
21	2.40	214	1⅝-2⅝	1⅝	2½	
24	3.14	265	2¾-3¾	1⅝	3	
27	3.98	322	2¾-4	1¼	3¼	
30	4.91	384	3¼-4¼	1¼	3½	
33	5.94	452	3¼-4¼	1½	3¾	
36	7.07	524	3¼-4¼	1½	4	
42	9.62	685	3¾-4¾	1¾	4½	
48	12.57	685	3¾-4¾	1⅞	5	
54	15.90	1070	4½-5½	2	5½	
60	19.63	1296	4½-5½	2¼	6	
66	23.76	1542	5-6	2⅝	6½	
72	28.27	1810	5⅝-6⅝	2⅝	7	
78	33.18	2098	6¼-7¼	2⅝	7½	
84	38.48	2410	5⅝-7¾	3⅝	8	
90	44.18	2793	6¾-8½	3⅝	8½	
96	50.27	3092	7-8¼	3½	9	
102	56.75	3466	7-8¼	3½	9½	
108	63.62	3864	7¼-8½	3¾	10	

- NOTES:
- All reinforcing steel shall meet AASHTO M170 requirements.
 - All circular, longitudinal, and elliptical reinforcement shall be assembled and securely fastened in cage fashion so as to maintain reinforcement in exact shape and correct positions within the forms.
 - Laying length of pipe: 12" to 66" (incl.) = not less than 4 feet
66" to 108" (incl.) = not less than 6 feet
 - Joints shall be sealed with rubber gaskets or with sealer approved by the engineer whenever pipe are specified for storm drain or sanitary sewers.
 - For Class IV and Class V reinforced concrete pipe and end section sizes which do not have reinforcement specified by AASHTO M170, shop drawings and design calculations shall be prepared and sealed by a Professional Engineer and submitted for the Engineer's review.

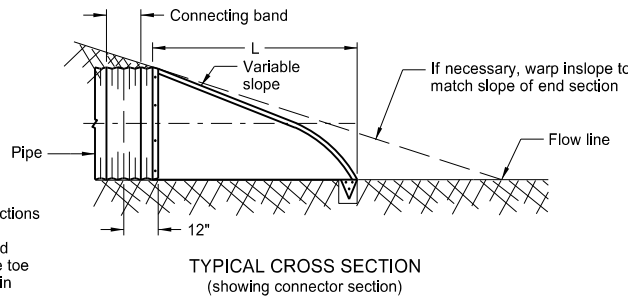
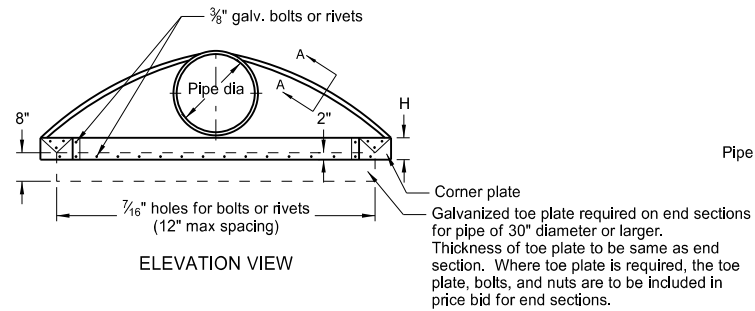
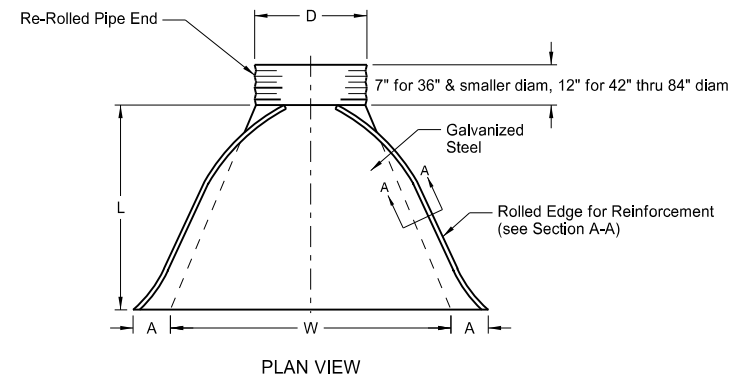
SEE STANDARD DRAWING D-714-22 FOR DETAILS OF CONCRETE PIPE TIES (TIE BOLTS).

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
05-12-14	
REVISIONS	
DATE	CHANGE
01-21-15	Revised Note 5

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ROUND CORRUGATED STEEL PIPE CULVERTS AND END SECTIONS

D-714-4



PIPE DIA.	GALV. THICK.	END SECTION DIMENSIONS					APPROX. SLOPE RATE	BODY PIECE
		A IN	B IN	H IN	L IN	W IN		
15	0.064	7	8	6	26	30	2 1/2:1	1
18	0.064	8	10	6	31	36	2 1/2:1	1
24	0.064	10	13	6	41	48	2 1/2:1	1
30	0.079	12	16	8	51	60	2 1/2:1	1 or 2
36	0.079	14	19	9	60	72	2 1/2:1	2
42	0.109	16	22	11	69	84	2 1/2:1	2
48	0.109	18	27	12	78	90	2 1/2:1	2
54	0.109	18	30	12	84	102	2:1	2
* 60	0.109	18	33	12	87	114	1 1/2:1	3
* 66	0.109	18	36	12	87	120	1 1/2:1	3
* 72	0.109	18	39	12	87	126	1 1/3 :1	3
* 78	0.109	18	42	12	87	132	1 1/4:1	3
* 84	0.109	18	45	12	87	138	1 1/6 :1	3

* These sizes have 0.109" sides and 0.138" center panels.

* * Pipe diameter is equal to dimension "D" of end section.

Manufacturers tolerances of above dimensions will be allowed.

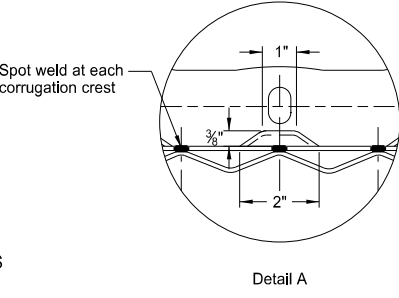
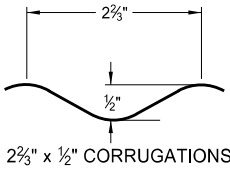
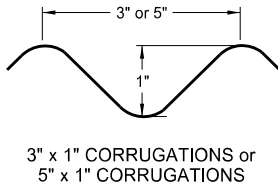
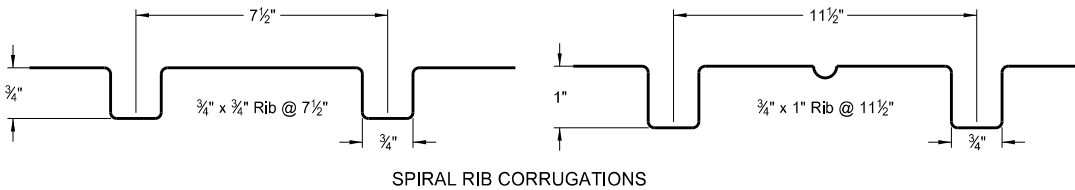
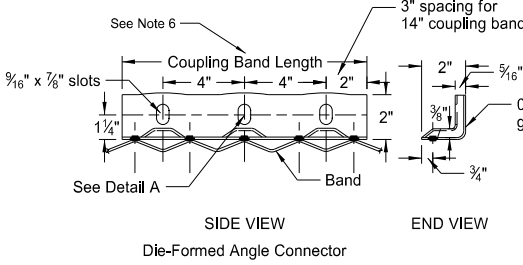
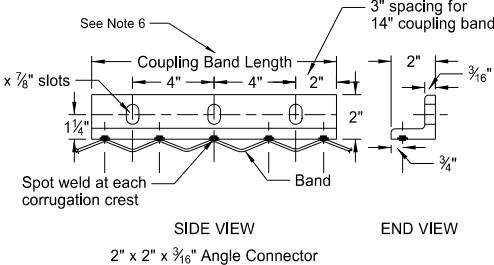
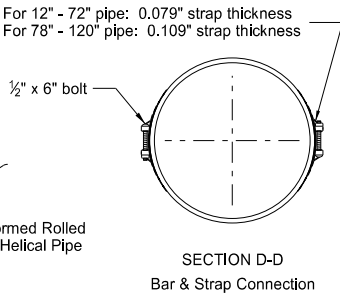
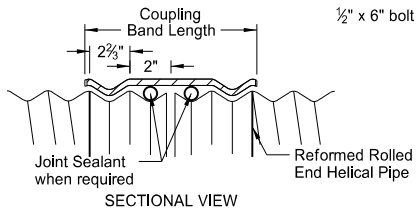
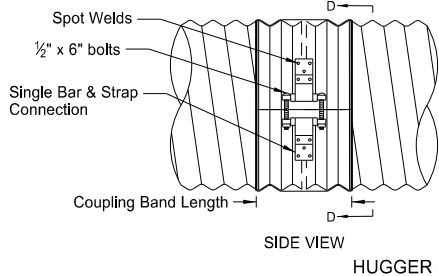
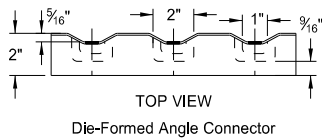
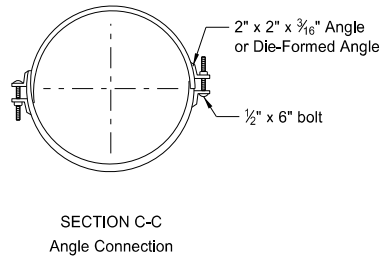
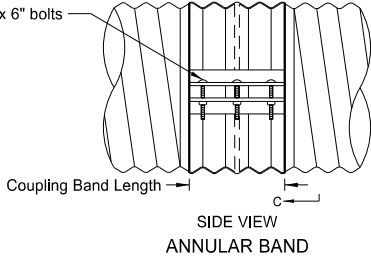
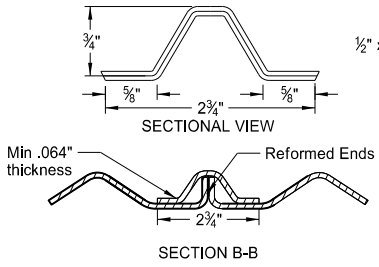
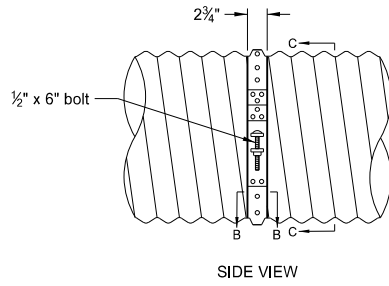
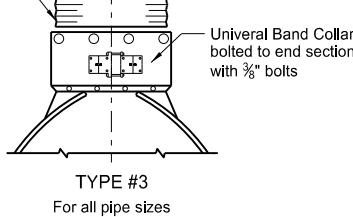
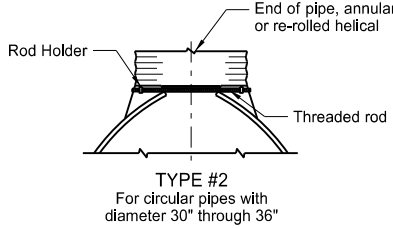
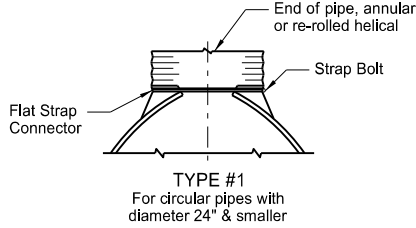
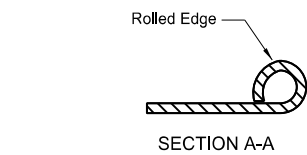
Splices to be the lap riveted type.

Multiple panel bodies shall have lap seams which are to be tightly joined with 3/8" dia. galv. bolts or rivets. Nuts to be torqued to 25 foot-lbs ±.

NOTES:

- Pipes and connecting bands shall conform to applicable sections of NDDOT Standard Specifications and to AASHTO M-36.
- Top edge of all end sections to have rolled edges for reinforcement (see Section A-A). The reinforced edges are to be supplemented with 2" x 2" x 1/8" galv. angle for 60" through 72" dia. and 2 1/2" x 2 1/2" x 1/4" galv. angle for 78" and 84" dia.. Angles to be attached by galv. 3/8" dia. bolts and nuts. Angles are to extend from pipe to the corner wing bend.
- Elongated pipes shall be factory preformed so that the vertical diameter shall be 5% greater and the horizontal diameter 5% less than a circular pipe.
- Coupling bands shall be two-piece for pipes larger than 36" as shown in Section C-C & D-D details. For pipes 36" and smaller, a one-piece band is acceptable.
- 1/2" x 8" bolts may be used as a substitute for the 1/2" x 6" bolts shown in the details.
- Coupling bands wider than 14" may be used if a minimum of four 1/2" bolts with maximum spacing of 5 1/2" are used for the connection.
- Length of spot welds shall be minimum 1/2".

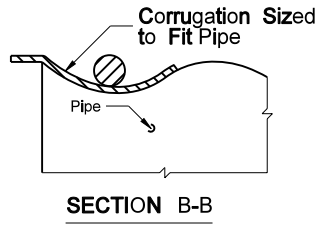
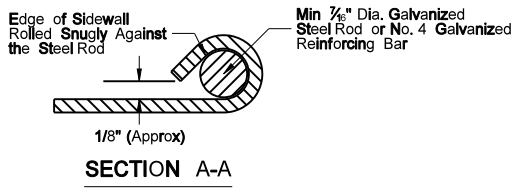
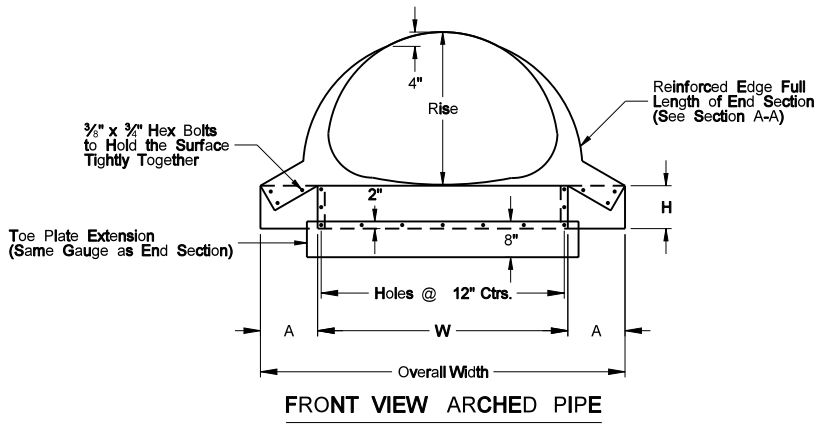
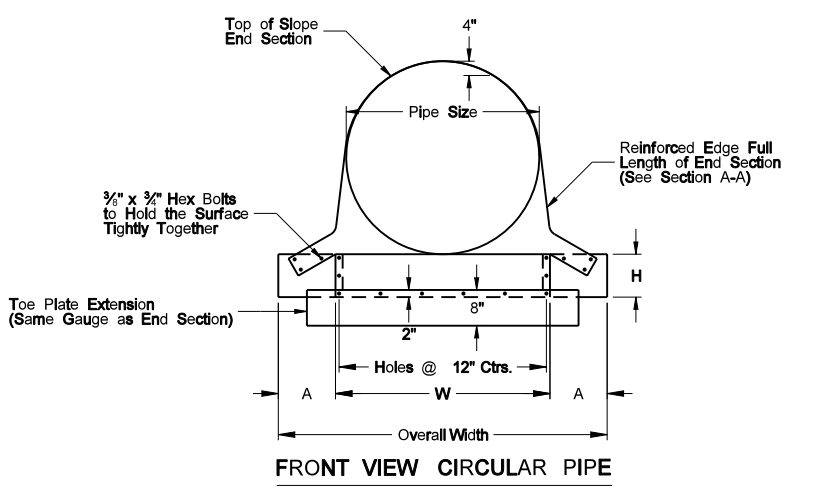
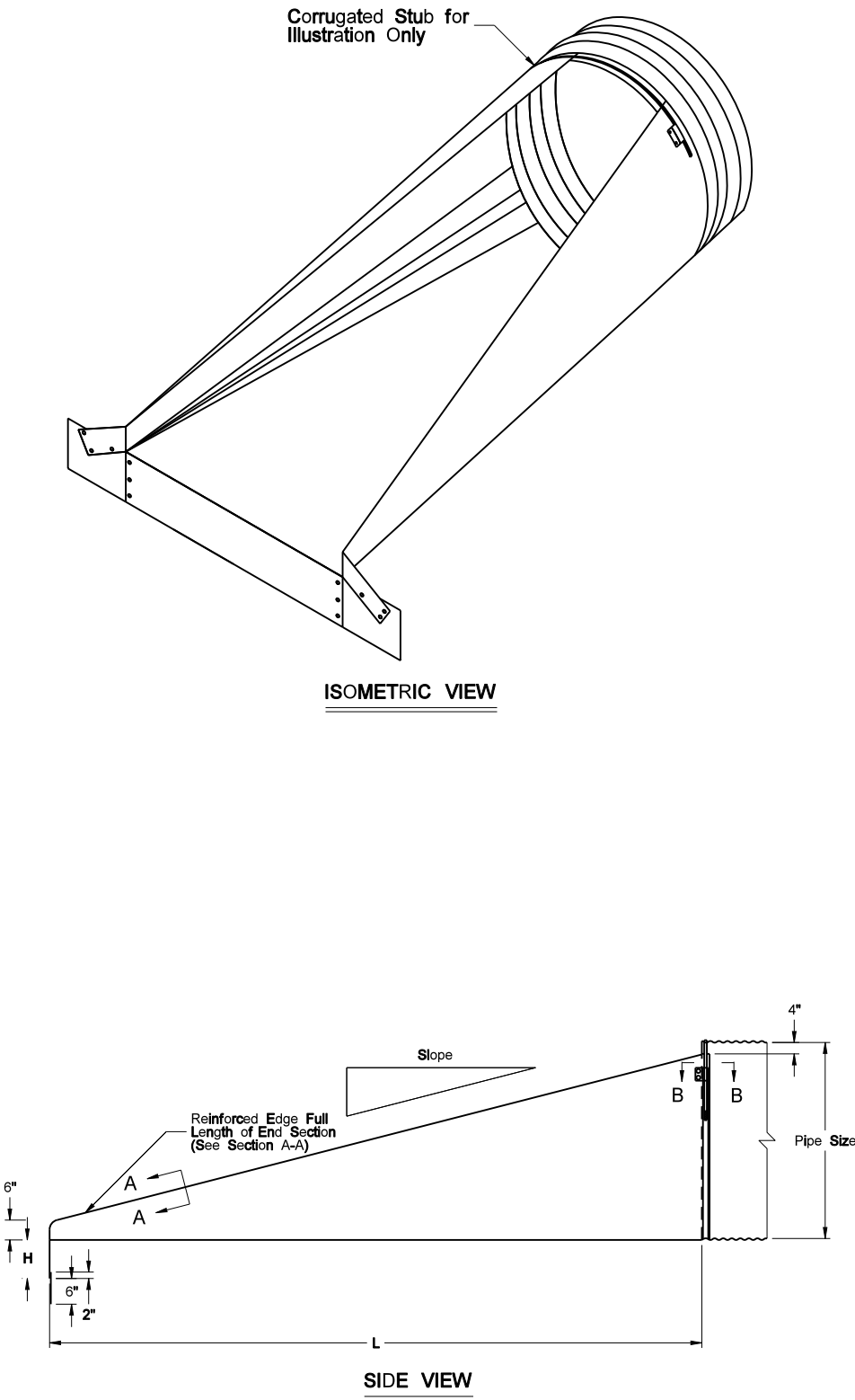
COUPLING BAND DIMENSIONS				
COUPLING TYPE	CORRUGATION PITCH x DEPTH	PIPE SIZE	COUPLING BAND LENGTH	MIN. BAND THICKNESS
Hat Band	2 2/3" x 1/2"	12" - 48"	2 3/4"	.064"
Annular Band	2 2/3" x 1/2"	12" - 72"	12"	.052"
		78" - 84"	12"	.079"
Hugger Band	2 2/3" x 1/2" Rerolled End	12" - 72"	10 1/2"	.052"
		78" - 84"	10 1/2"	.079"
	3" x 1" Rerolled End	48" - 120"	10 1/2"	.052"
		48" - 120"	12"	.064"



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
08-06-13	
REVISIONS	
DATE	CHANGE
01-07-14	End Section Plan View
02-27-14	3" x 1" Corrugation Detail

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TRAVERSABLE END SECTIONS FOR CORRUGATED STEEL PIPE CULVERTS



TRAVERSABLE END SECTIONS FOR CIRCULAR PIPES										
Pipe Dia. (in.)	Min. Thick.		Dimensions (inches)				L Dimensions			
	in.	Gauge	A	H	W	Overall Width	Slope	Length (in.)	Slope	Length (in.)
15	.064	16	8	6	21	37	4:1	20	6:1	30
18	.064	16	8	6	24	40	4:1	32	6:1	48
24	.064	16	8	6	30	46	4:1	56	6:1	84
30	.109	12	12	9	36	60	4:1	80	6:1	120

TRAVERSABLE END SECTIONS FOR ARCHED PIPES												
Equiv. Dia. (in.)	(inches)		Min. Thick.		Dimensions (inches)				L Dimensions			
	Span	Rise	in.	Gauge	A	H	W	Overall Width	Slope	Length (in.)	Slope	Length (in.)
18	21	15	.064	16	8	6	27	43	4:1	20	6:1	30
21	24	18	.064	16	8	6	30	46	4:1	32	6:1	48
24	28	20	.064	16	8	6	34	50	4:1	40	6:1	60

Note: See Standard Drawing D-714-04 for end section to pipe details.

For 15", 18" and 24" diameter end sections, 1/2" diameter rod, or strap type connection to corrugated steel pipe shall be used.

For 30" diameter round end sections, rod type connection to corrugated steel pipe, using 5/8" diameter rod shall be used.

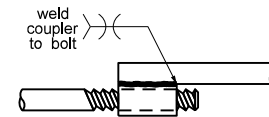
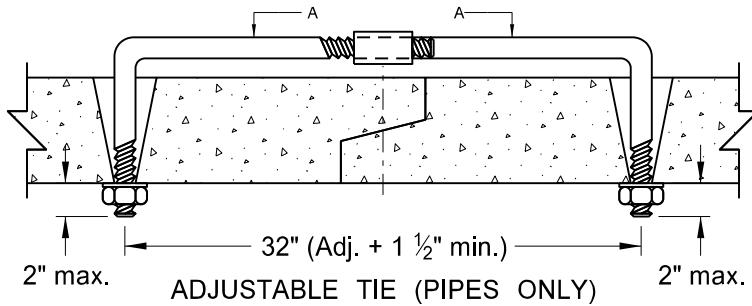
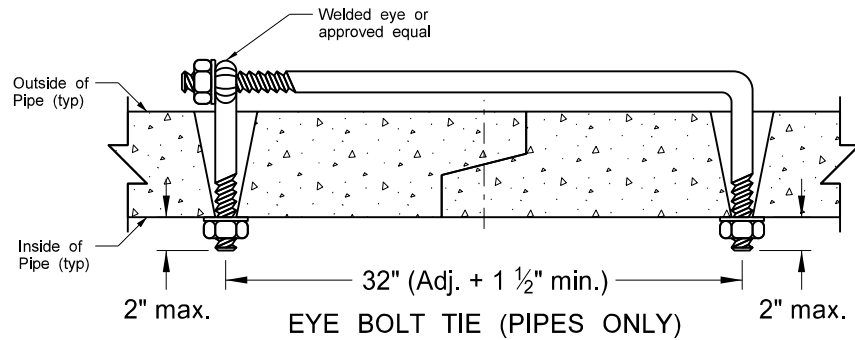
For arched pipe end sections (21" X 15" through 28" X 20"), rod type connection to corrugated steel pipe, using 1/2" diameter rod shall be used.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-23-09	
REVISIONS	
DATE	CHANGE

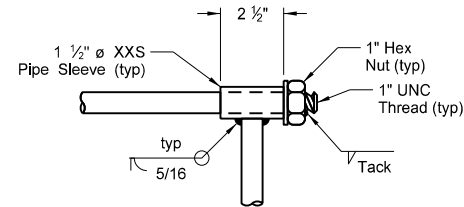
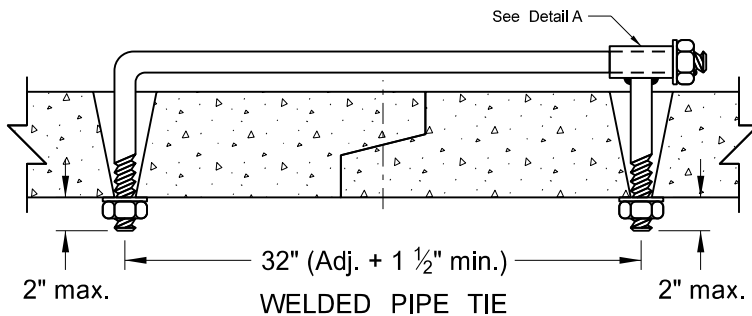
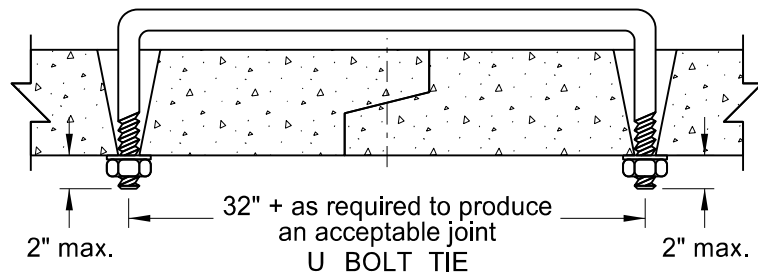
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CONCRETE PIPE OR PRECAST
CONCRETE BOX CULVERT TIES

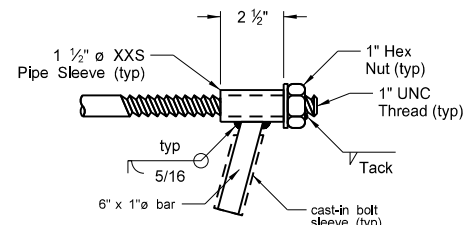
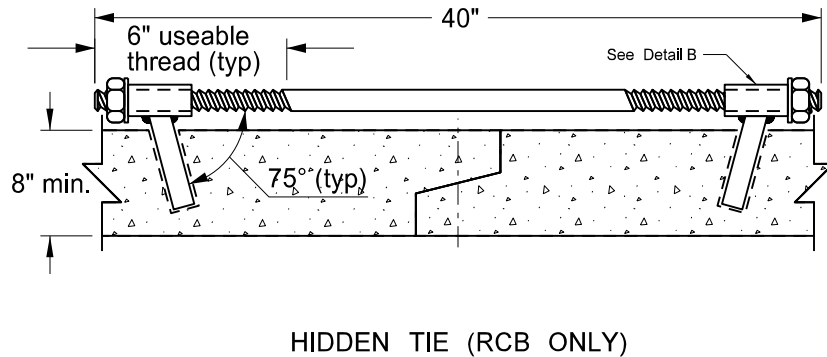
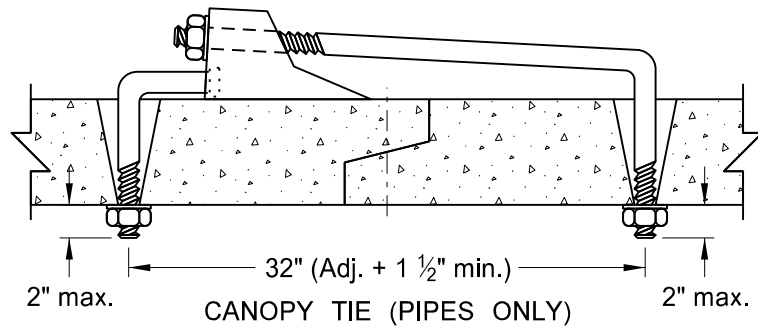
D-714-22



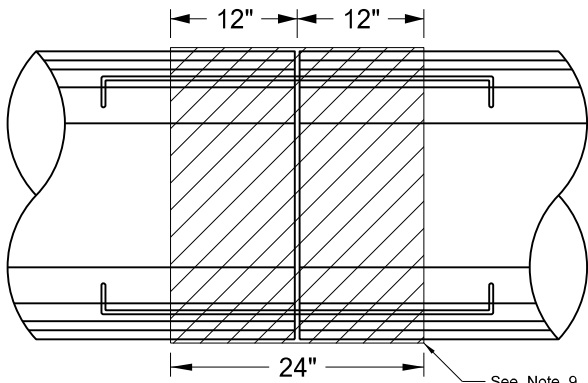
SECTION A-A



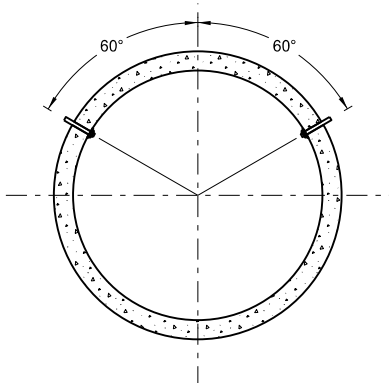
DETAIL A



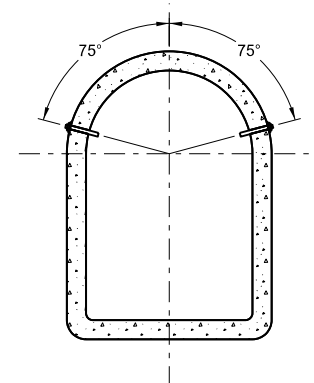
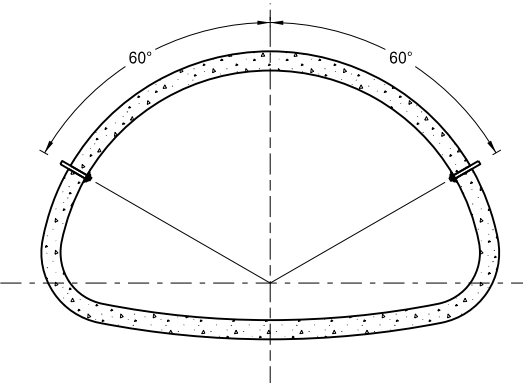
DETAIL B



PLAN VIEW



END VIEW



REQUIRED SIZE OF TIE BOLTS		
Pipe Size	Thread ϕ	XXS Pipe Sleeve Inner ϕ
18" - 24"	$\frac{5}{8}$ " See note 2	$\frac{3}{4}$ "
30" - 66"	$\frac{3}{4}$ "	1"
72" - 78"	1"	1 $\frac{1}{4}$ "
RCB		

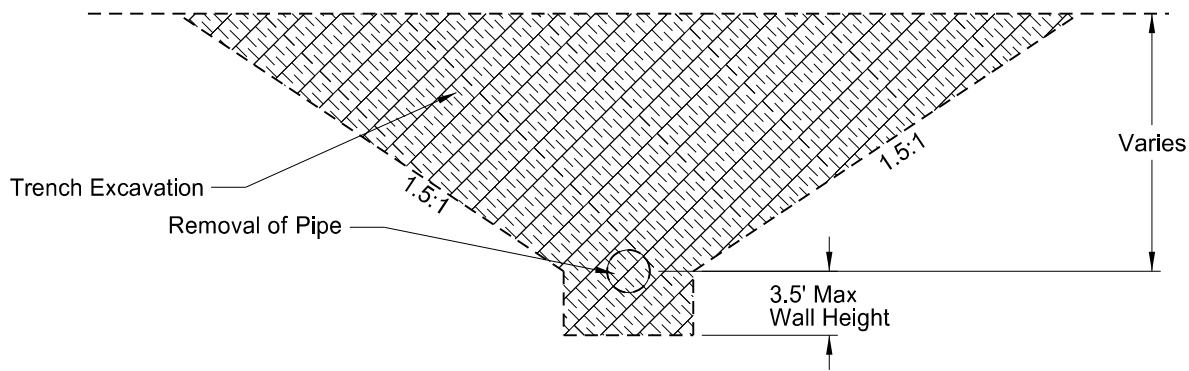
- NOTES:
- The pipe size listed is the inside diameter of round pipe or the equivalent diameter of pipe arch.
 - Nuts and washers are not required on Jacked and Bored pipes or pipes with a 24" diameter or less. Where nuts and washers are not used, the tie bars shall be inserted and grouted into place.
 - Ties are only for holding pipe or RCB sections together, not for pulling sections tight.
 - Tie bolt assembly shall be hot dip galvanized in accordance with AASHTO M232.
 - Holes in pipes to accommodate tie bolts can be precast or drilled. Tapered holes are permitted when precast. Holes shall have a diameter $\frac{1}{4}$ " larger than the diameter of the thread. Holes in precast RCB's shall contain cast-in bolt sleeves with an inside diameter of 1 $\frac{1}{4}$ ".
 - The contractor has the option of selecting the type of tie bolt used from those shown.
 - The cost of precasting or drilling the required holes and furnishing and installing the tie bolts shall be included in the price bid for the appropriate conduit or RCB pay item.
 - All centerline and approach RCP culvert joints shall be tied. Storm drain systems shall have the first three joints including the end section of all free ends tied. Free ends are defined as any storm drain end which does not terminate at an inlet or manhole. Outfall culverts with end sections which drain adjacent ditches are examples of free ends.
 - When joint wrap is specified in the plans, place wrap beneath ties. Overlap the joint by 12" in both directions.
 - Tie bolts shall conform to ASTM A 36. Nuts shall be heavy hex and conform to ASTM A 563. Washers shall conform to ASTM F 436, Type 1. Welded pipe sleeves and cast-in bolt sleeves shall conform to ASTM A 53, Grade B.
 - Cattle Pass and Jacked and Bored pipes shall have pipe ties inserted from the inside of the pipes and grouted into place. Jacked and bored pipes with a diameter of 24" or less do not require pipe ties.
 - RCB tie locations shall be as shown on the plans.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
3-18-14	
REVISIONS	
DATE	CHANGE
7-21-15	Note 8

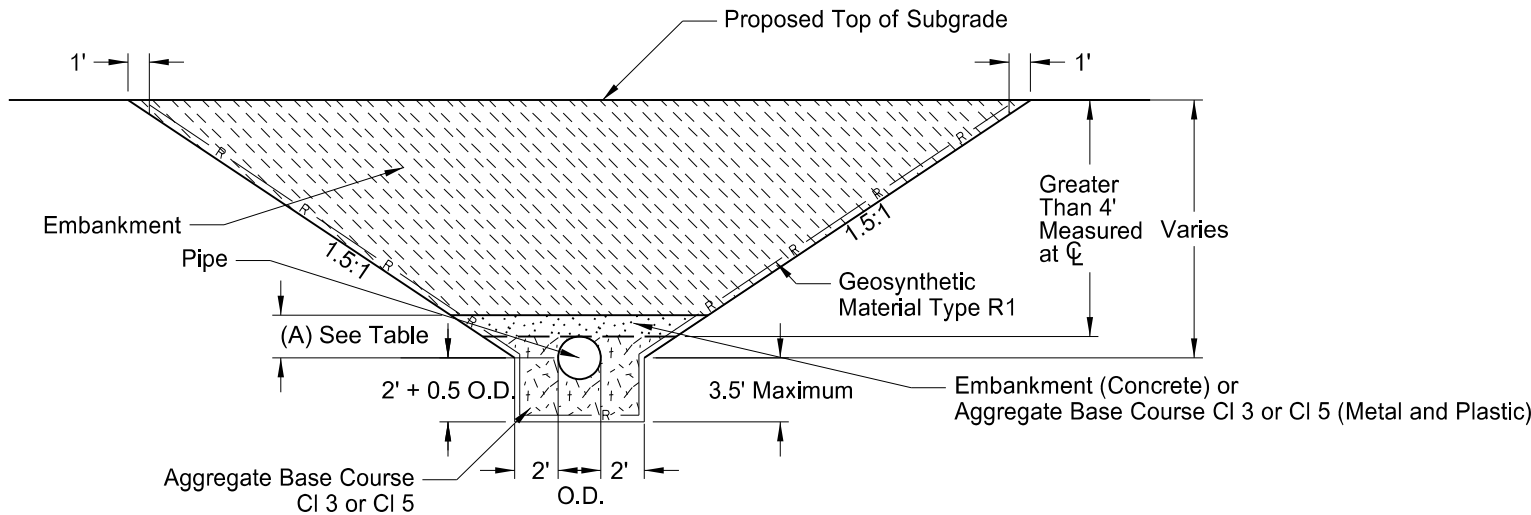
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TRANSVERSE MAINLINE PIPE INSTALLATION DETAIL
PIPES MORE THAN 4 FEET BELOW TOP OF SUBGRADE

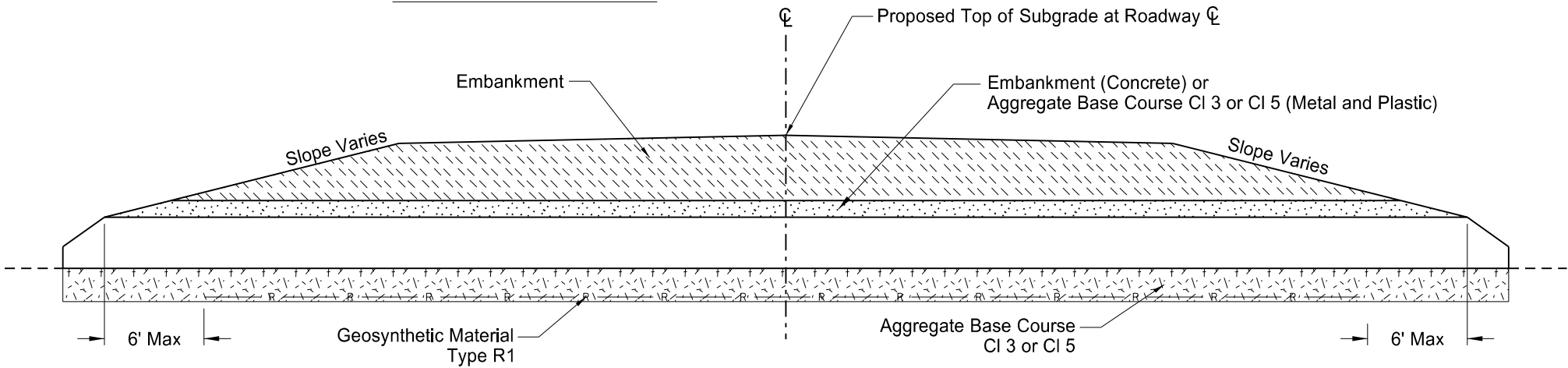
D-714-25



EXCAVATION DETAIL



INSTALLATION DETAIL



CROSS SECTION

Pay Items

- 1) Pipe*
- 2) Geosynthetic Material Type R1
- 3) Removal of Pipe (if required)

*Included in Pipe Pay Item

- 1) Pipe
- 2) Trench excavation
- 3) Aggregate Base Course CI 3 or CI 5
- 4) Embankment

NOTES:

- 1) This drawing applies to new/replaced mainline and paved intersection roadways (including ramps). It does not include pipes in approaches.
- 2) Embankment may be either Borrow Excavation or Common Excavation - Type A

Backfill Dimensions	
Pipe Materials	Dimension (A)
Concrete	0.5 O.D.
Metal and Plastic	0.5 O.D. + 1 Foot

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-26-13	
REVISIONS	
DATE	CHANGE
10-15-13	Label Formatting
1-21-14	Nomenclature
9-18-15	Title Rewording
12-10-15	Added Plastic Pipe

This document was originally issued and sealed by
Ron Horner,
Registration Number
PE-2087,
on 12/10/2015 and the original document is stored at the
North Dakota Department
of Transportation

TRANSVERSE MAINLINE PIPE INSTALLATION DETAIL
PIPES 4 FEET OR LESS BELOW TOP OF SUBGRADE

Pay Items

- 1) Pipe*
- 2) Geosynthetic Material Type R1
- 3) Removal of Pipe (if required)

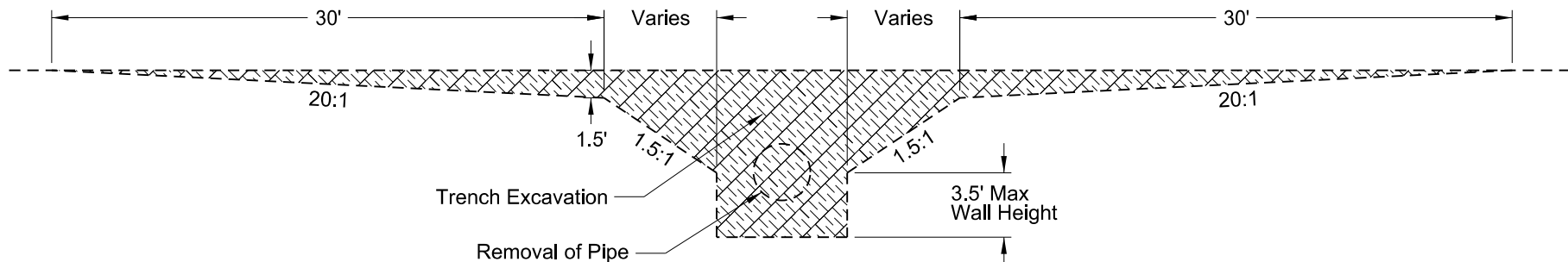
*Included in Pipe Pay Item

- 1) Pipe
- 2) Trench Excavation
- 3) Aggregate Base Course CI 3 or CI 5
- 4) Embankment

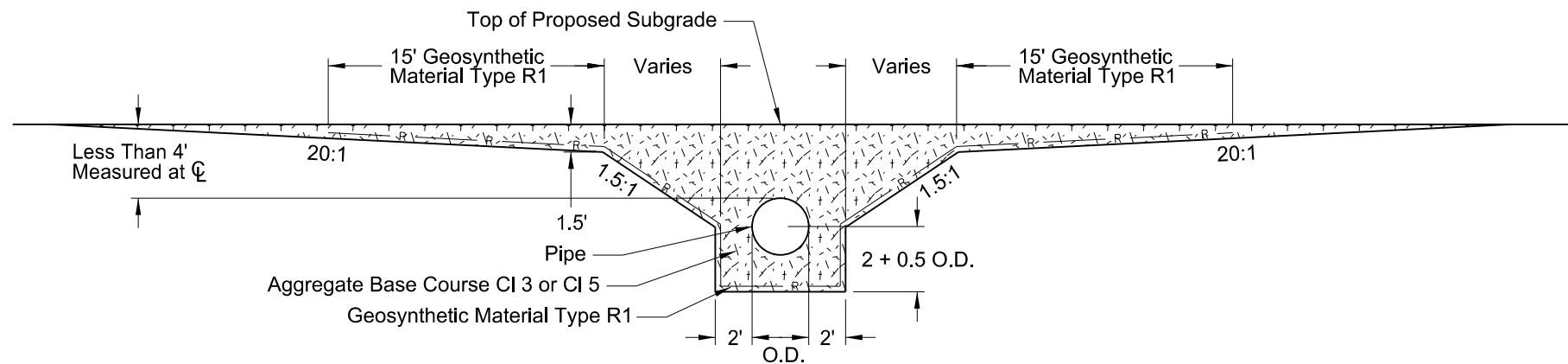
NOTES:

- 1) This drawing applies to new/replaced mainline and paved intersection roadway pipes only (including ramps). It does not include pipes in approaches.
- 2) Embankment may be either Borrow Excavation or Common Excavation - Type A

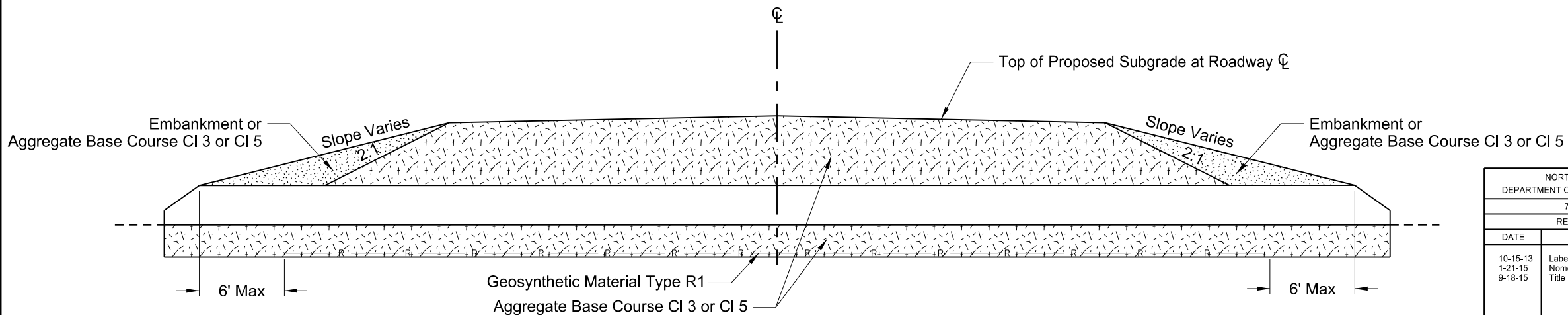
EXCAVATION DETAIL



INSTALLATION DETAIL



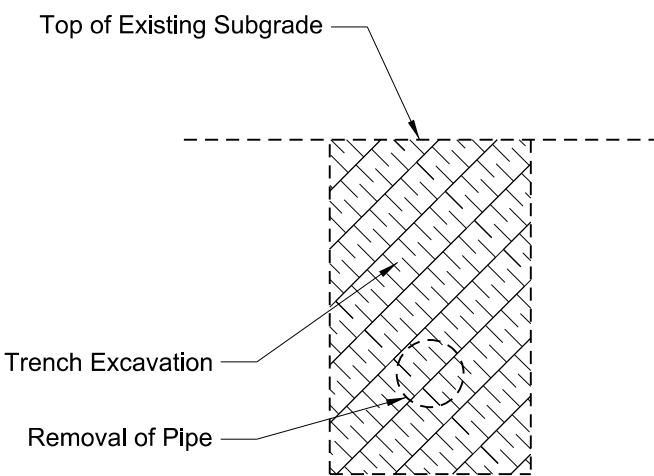
CROSS SECTION



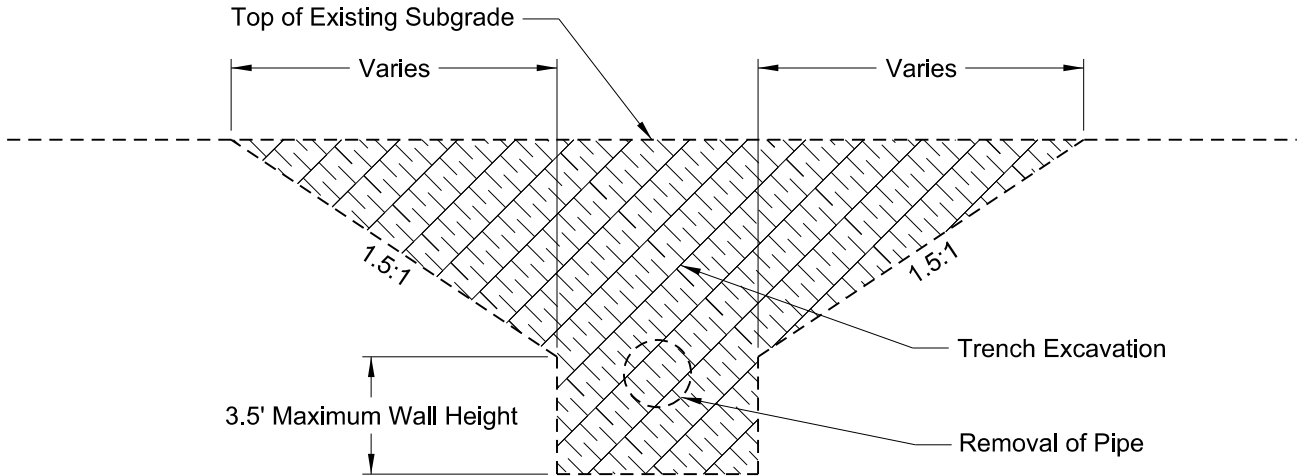
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-26-13	
REVISIONS	
DATE	CHANGE
10-15-13 1-21-15 9-18-15	Label Formatting Nomenclature Title Rewording

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PIPE INSTALLATION DETAIL FOR LONGITUDINAL MAINLINE PIPE
OR PIPE NOT UNDER THE ROADWAY



EXCAVATION DETAIL A



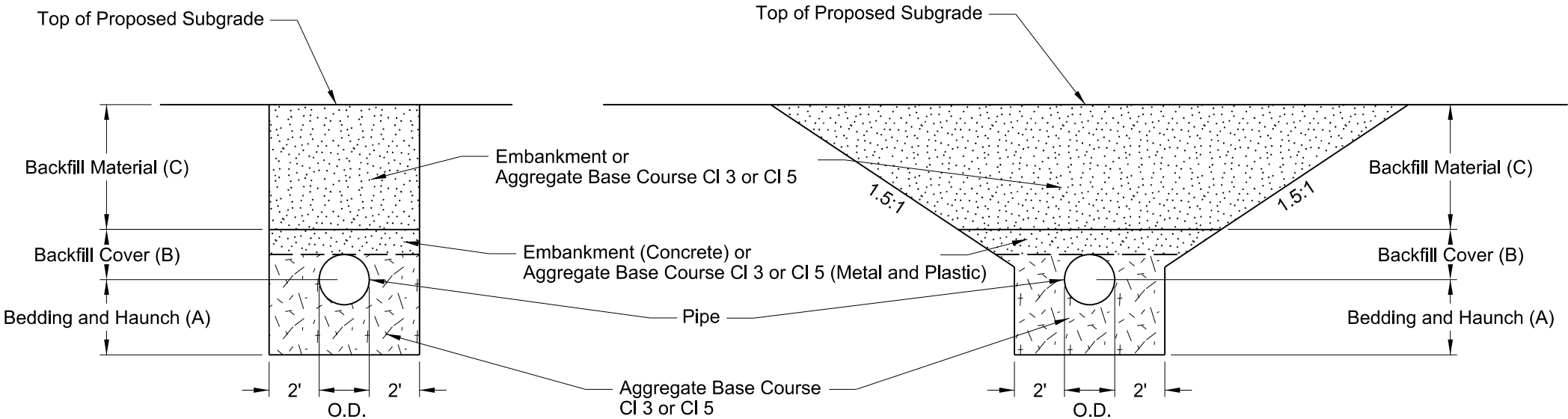
EXCAVATION DETAIL B

- Pay Items
1) Pipe*
2) Removal of Pipe (if required)

- *Included in Pipe Pay Item
1) Pipe
2) Trench excavation
3) Aggregate base course CI 3 or CI 5
4) Embankment

- NOTES:
1) This drawing does not apply to pipes in approaches.
2) It is the contactor's option to select Detail A or B.
3) Embankment may be either Borrow Excavation or Common Excavation - Type A

Bedding and Haunch (A)
Pipes Not Under Roadway = 0.5 O.D. + 4 Inches
Pipes Under the Roadway = 0.5 O.D. + 2 Feet
Backfill Cover (B)
Concrete Pipe = 0.5 O.D.
Metal and Plastic = 0.5 O.D. + 1 Foot
Backfill Material (C)
Top of Pipe 4 Feet or Less Below the Top of Proposed Subgrade = Aggregate Base Course CI3 or CI 5
Top of Pipe Greater than 4 Feet Below the Top of Proposed Subgrade = Common Excavation - Type A
Pipe Not Under Roadway = Common Excavation - Type B

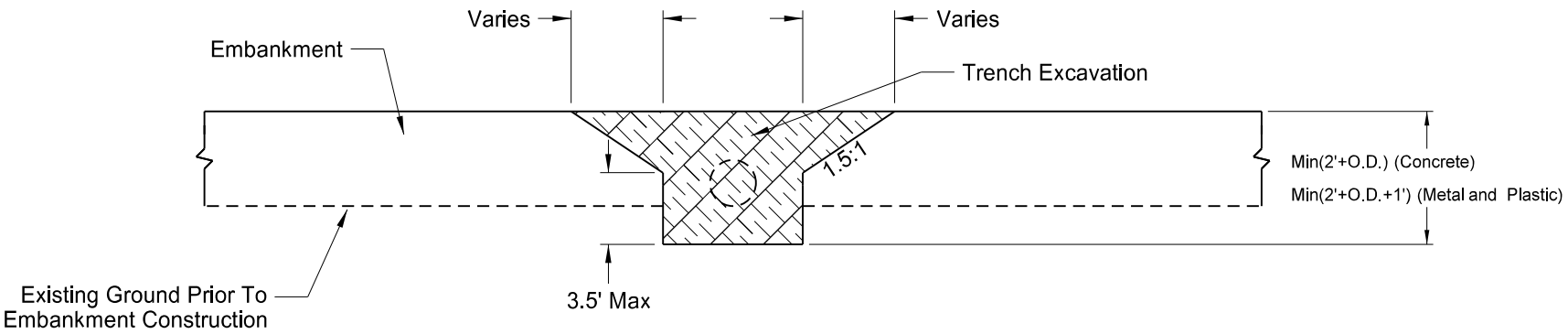


BACKFILL DETAIL A

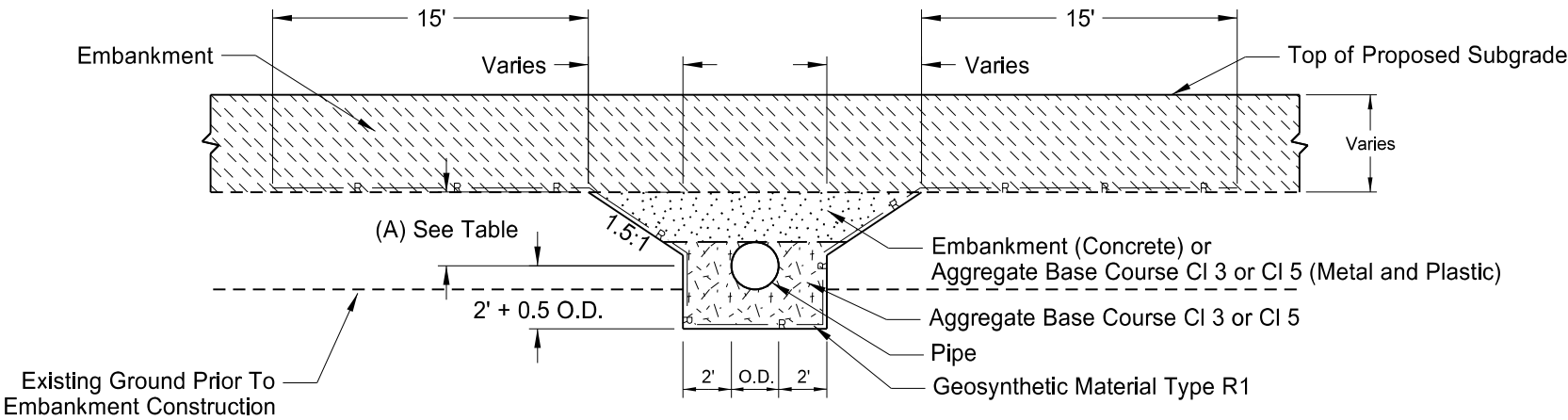
BACKFILL DETAIL B

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7-26-13		
REVISIONS		
DATE	CHANGE	
10-15-13 1-21-15 12-10-15	Label Formatting Nomenclature Added Plastic Pipe	

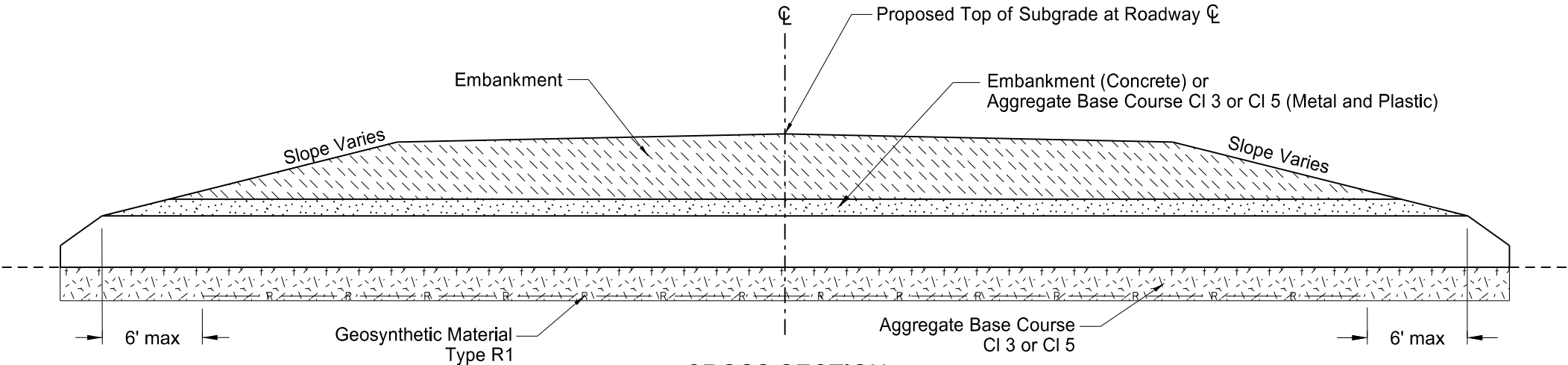
TRANSVERSE MAINLINE PIPE INSTALLATION DETAIL FOR PIPES INSTALLED IN NEW EMBANKMENT AREAS



EXCAVATION DETAIL



INSTALLATION DETAIL



CROSS SECTION

Pay Items
1) Pipe*
2) Geosynthetic Material Type R1

*Included in Pipe Pay Item
1) Pipe
2) Trench excavation
3) Aggregate base course CI 3 or CI 5
4) Embankment

- NOTES:
- 1) This drawing applies to new/extended mainline and paved intersection roadway pipes only (including ramps). It does not include pipes in approaches
 - 2) Embankment may be either Borrow Excavation or Common Excavation - Type A

Backfill Dimensions	
Pipe Materials	Dimension (A)
Concrete	0.5 O.D.
Metal and Plastic	0.5 O.D. + 1 Foot

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-26-13	
REVISIONS	
DATE	CHANGE
10-15-13 1-21-15 12-10-15	Label Formatting Nomenclature Added Plastic Pipe

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STANDARD MONUMENTS AND RIGHT OF WAY MARKERS

NOTES:

The construction and installation of Alignment Monuments, Iron Pin Reference Monuments, Iron Pin R/W Monuments, and Right of Way Markers (witness posts) shall conform to Section 720 of the Standard Specifications.

ALIGNMENT MONUMENTS:

Iron Pin or Precast Concrete Alignment Monuments with aluminum caps will be placed on the centerline alignment PI's, section corners, quarter corners, section line crossings, quarter line crossings, and at curve points (PC's, PT's, TS's, and ST's) on the centerline.

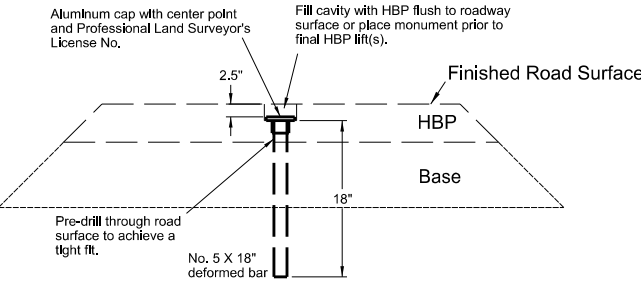
IRON PIN R/W MONUMENT:

Iron pins with aluminum caps (No. 5 X 18") will be placed at breaks on the Right of Way line, and at curve points (PC's, PT's, TS's and ST's) on the Right of Way line.

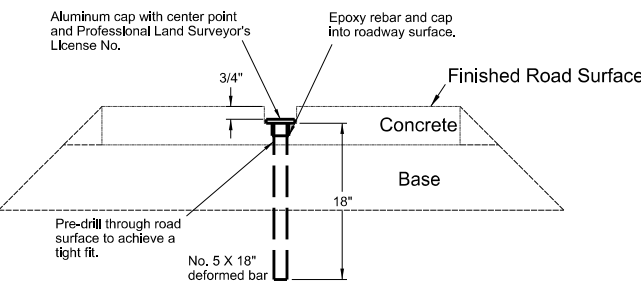
IRON PIN REFERENCE MONUMENT:

Iron Pins without aluminum caps (No. 5 X 18") will be placed as reference monuments on the Right of Way line at section corners, quarter corners, section line crossings, and quarter line crossings.

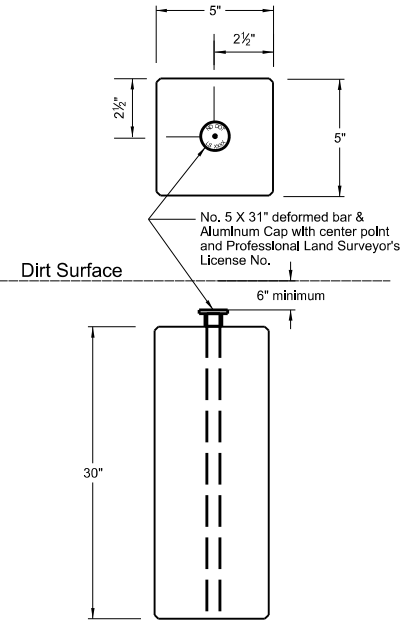
ALIGNMENT MONUMENT DETAILS



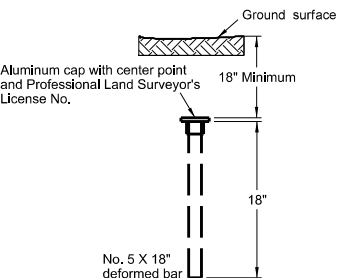
IRON PIN
(Within Finished Roadway Surface)



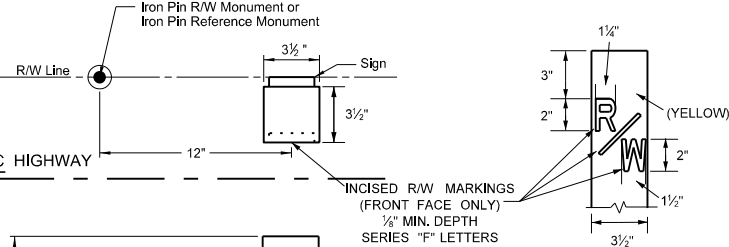
IRON PIN
(Within Finished Roadway Surface)



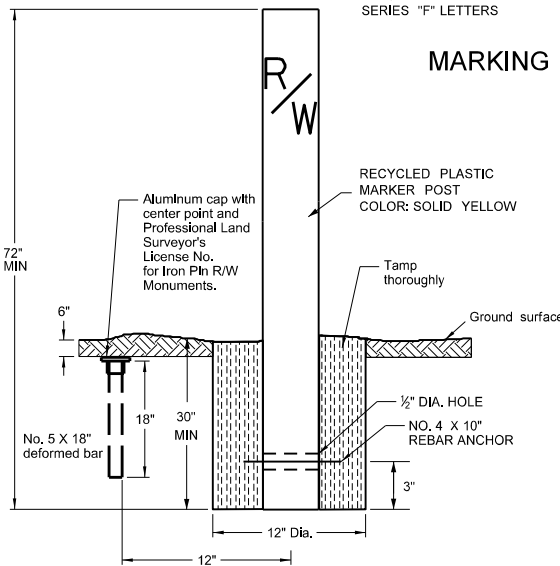
PRECAST CONCRETE
(Outside Finished Roadway Surface)
(Inside R/W Limits)



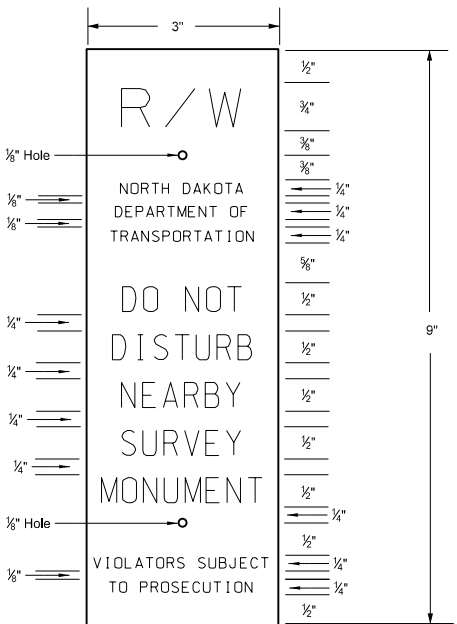
IRON PIN
(Outside Finished Roadway Surface)
(Outside R/W Limits)



MARKING DETAIL



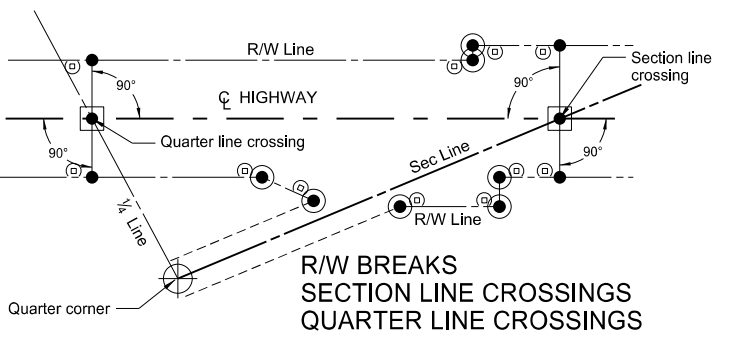
RECYCLED PLASTIC
RIGHT OF WAY MARKER
(WITNESS POST) DETAILS
&
IRON PIN REFERENCE AND R/W
MONUMENT DETAILS



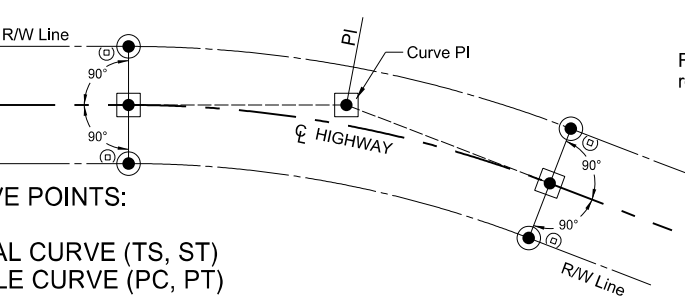
SIGN DETAIL

Black letters on orange high intensity background sheeting meeting ASTM D-4956 Type III or higher on 80 gauge 5052-H38 aluminum. Silk screen graphics. One color print. Sign shall be attached by drilling two holes in the face of the post (side facing the private owner, away from the Department of Transportation right of way). Put inserts into the holes and mount the sign with #4 vandal proof screws. Sign shall be installed 2" from top of post.

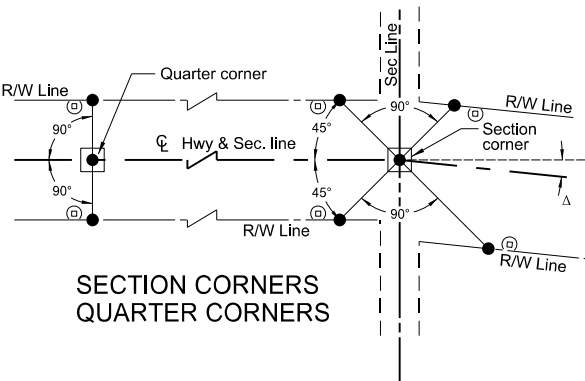
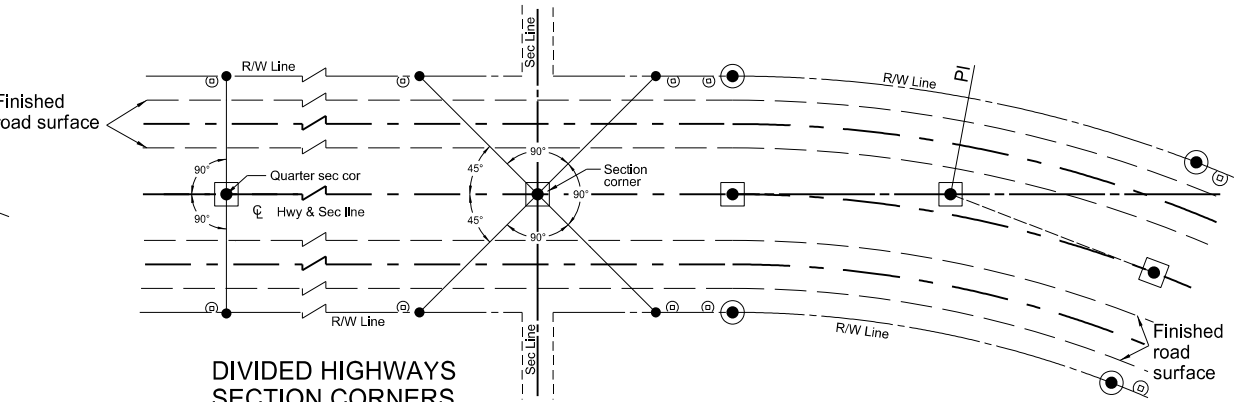
VARIOUS MONUMENT AND MARKER PLACEMENTS



CURVE POINTS:
PI
SPIRAL CURVE (TS, ST)
SIMPLE CURVE (PC, PT)

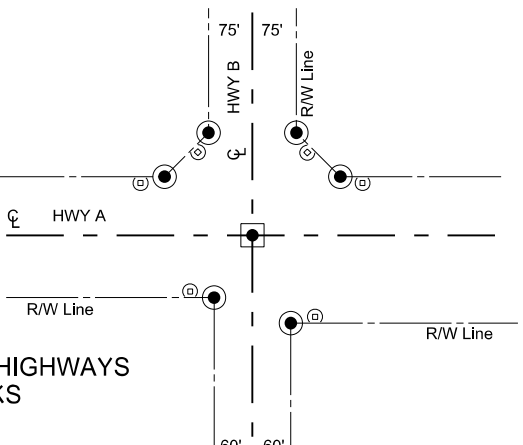


DIVIDED HIGHWAYS
SECTION CORNERS
QUARTER CORNERS



SECTION CORNERS
QUARTER CORNERS

INTERSECTION OF HIGHWAYS
FLARED R/W BREAKS

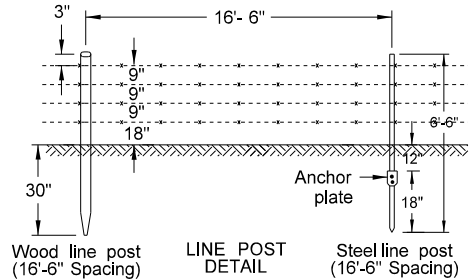
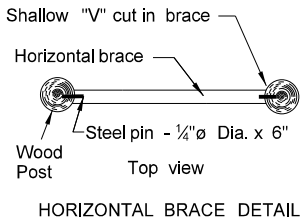
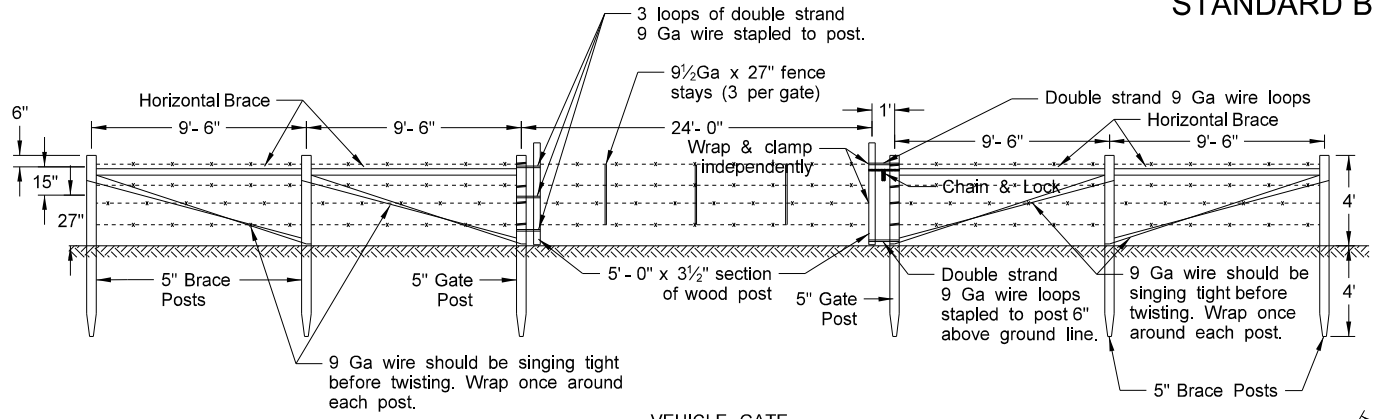


- LEGEND
- Iron Pin Reference Monument
 - ⊙ R/W Marker (witness post)
 - Alignment Monument
 - Iron Pin R/W Monument

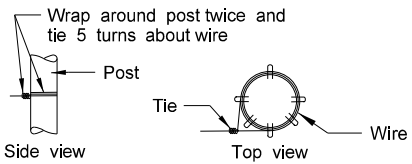
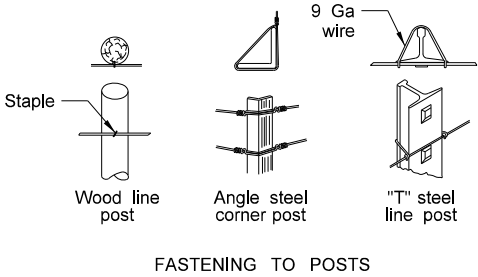
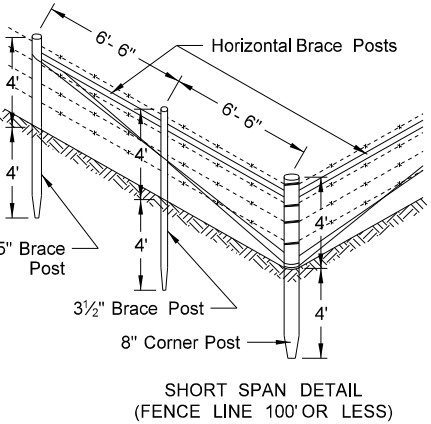
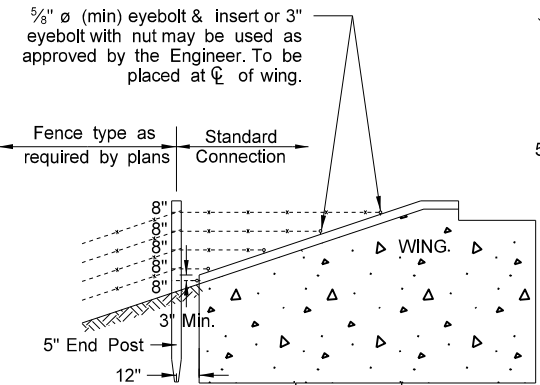
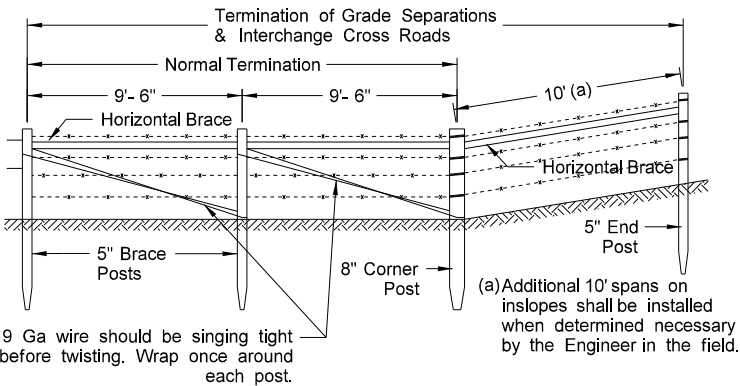
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-2013	
REVISIONS	
DATE	CHANGE
11/12/13	Note for SIGN DETAIL modified to meet ASTM D-4956 Type III or higher on 80 gauge 5052-H38

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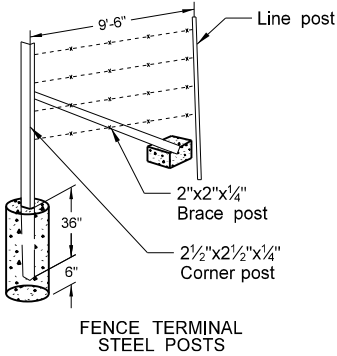
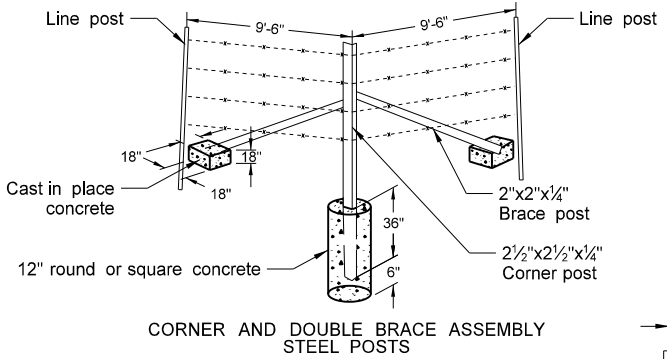
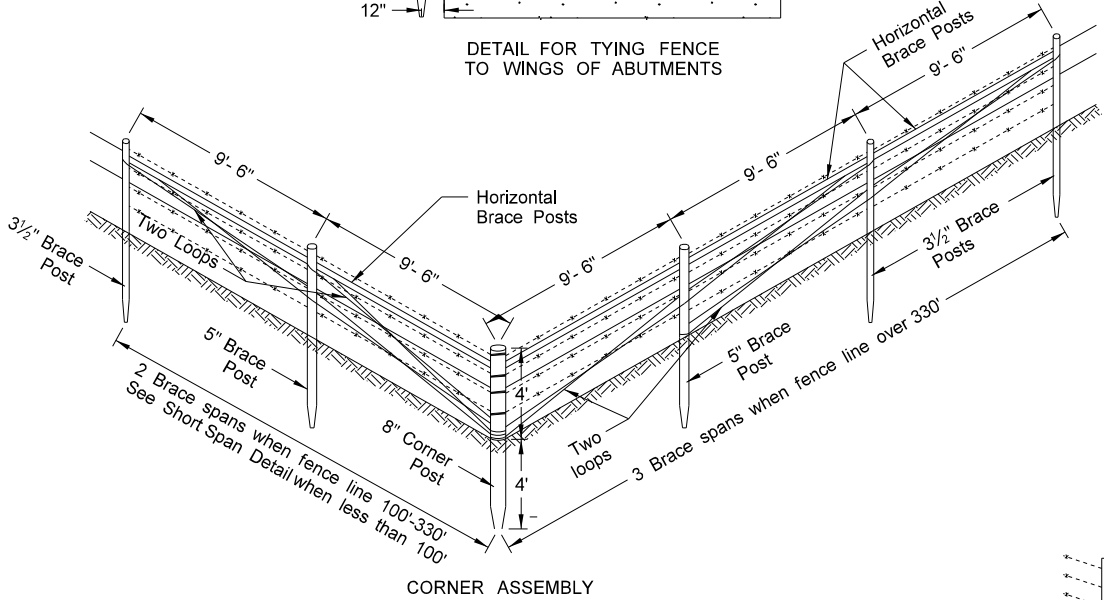
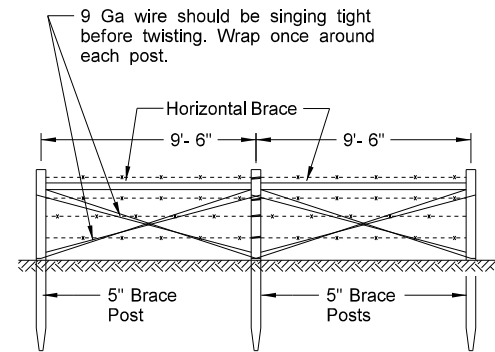
STANDARD BARBED WIRE FENCE



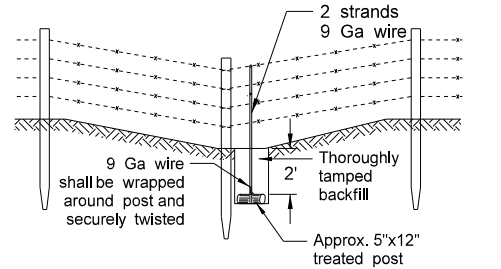
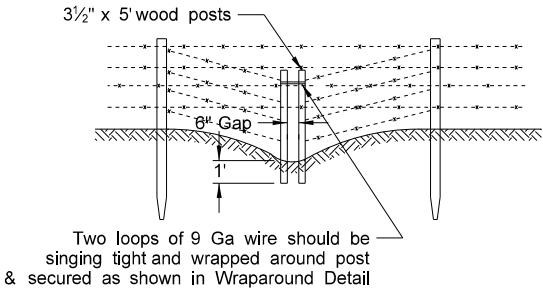
- NOTES**
1. No deduction in measured pay length of cable fence will be made for gates, corner assemblies, double brace assemblies, fence terminals, or depression fencing. Abutment fencing shall be included in the price bid for fencing bid items.
 2. Double brace assemblies shall be installed at locations shown on the plans or established by the Engineer. The distance between adjacent fence terminals, corner assemblies, or double brace assemblies shall not exceed 1,320 feet.
 3. Cost of furnishing and installing inserts and eyebolts shall be included in the unit price bid for fencing bid items. Eyebolts shall be galvanized according to AASHTO designation M-30; inserts of corrosion resistant material need not be galvanized. Concrete inserts shall be of such design that, when installed in the concrete, will be capable of developing the full strength of the 5/8" diameter threaded eyebolt.
 4. The type of posts to be used, either wood or steel, shall be determined by the contractor unless otherwise specified in the plans.



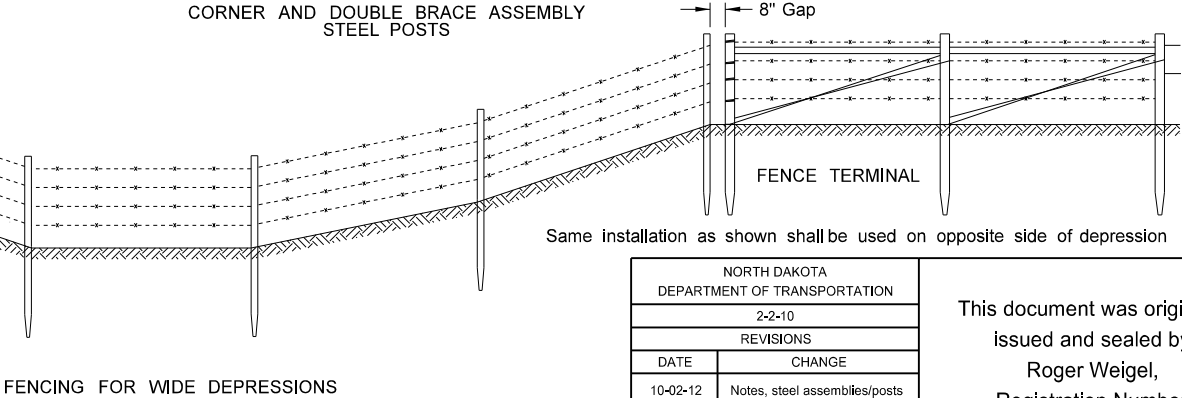
USE OF POST	POST SIZES				
	TREATED WOOD	STEEL			
	Post dia.	Post length	Post length	Post wt. Lbs/Ft	Anchor wt. Lbs.
Line post	3 1/2"	6'-6"	6'-6"	1.33	0.67
Corner post	8"	8'	7'	4.10	(Conc.)
End post	5"	8'			
Brace post	5"	3 1/2"	8'	3.19	(Conc.)
Gate post	5"	8'			
Horizontal brace	3 1/2"	Var.	As approved by the Engineer		



DOUBLE BRACE ASSEMBLY



*Locations shall be determined in the field and included in price bid for fencing. Other methods of anchoring the fence may be used if approved by the Engineer.



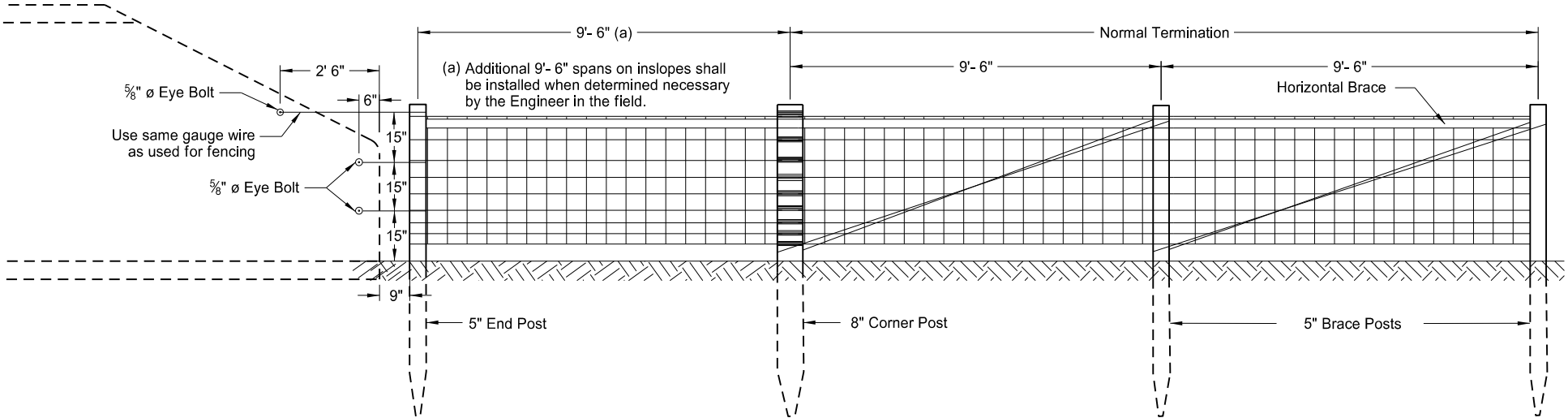
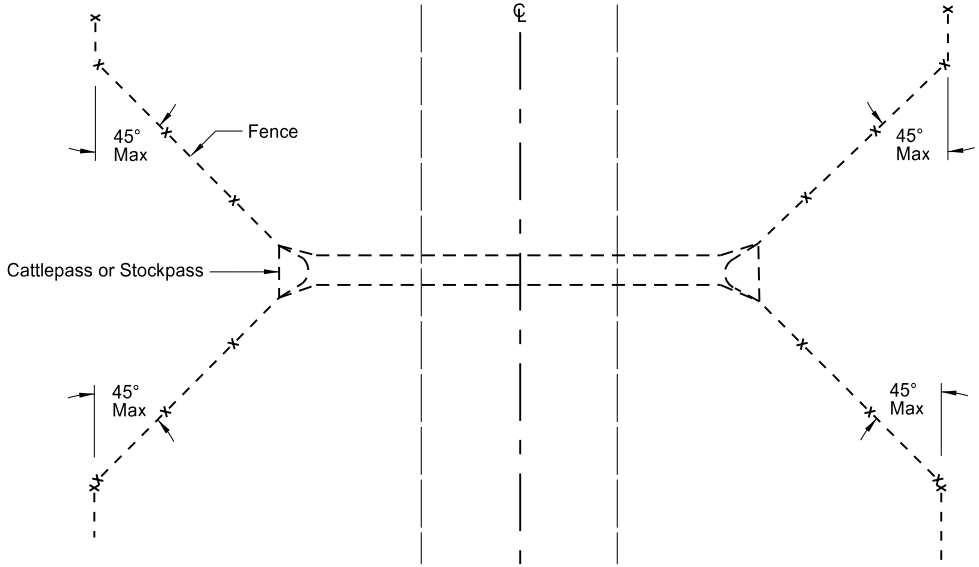
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-2-10	
REVISIONS	
DATE	CHANGE
10-02-12	Notes, steel assemblies/posts
11-25-13	Revised Vehicle Gate

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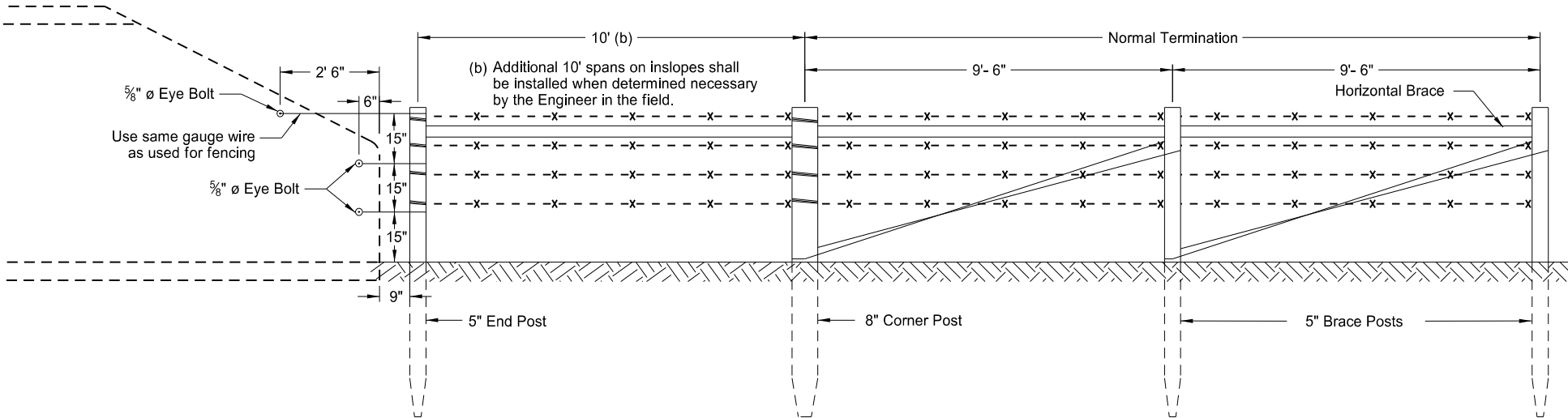
CONCRETE CATTLE & STOCKPASS FENCING STANDARD

D-752-4

- NOTES:
1. See Standard Drawings D-752-1 BARBED WIRE FENCE and D-752-3 STANDARD WOVEN WIRE FENCE for fencing details.
 2. Cost of furnishing and installing inserts, eyebolts, and wire shall be included in the unit price bid for fencing bid items. Eyebolts shall be galvanized according to AASHTO designation M-30; inserts of corrosion resistant material need not be galvanized. Concrete inserts shall be of such design that, when installed in the concrete, will be capable of developing the full strength of the 5/8" diameter threaded eyebolt.



Fence Terminal Standard Woven Wire Fence



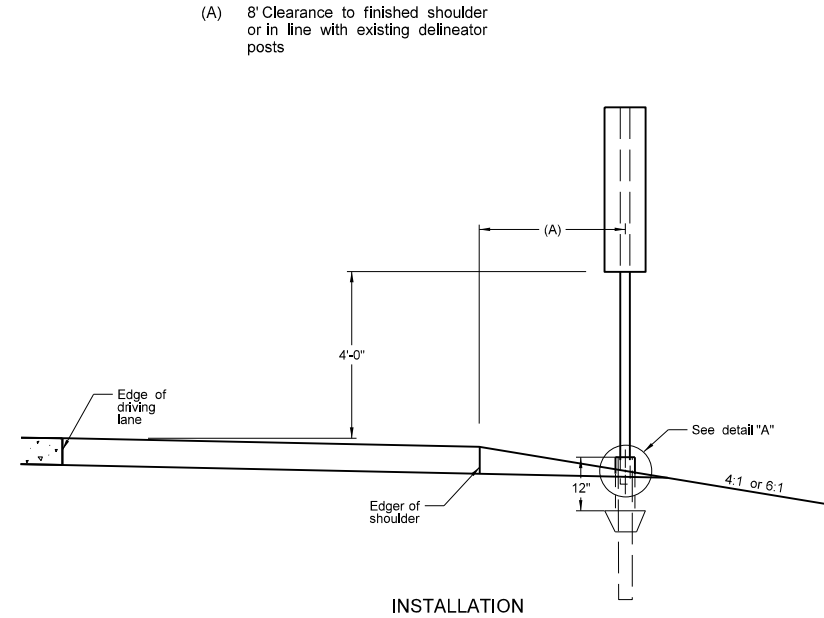
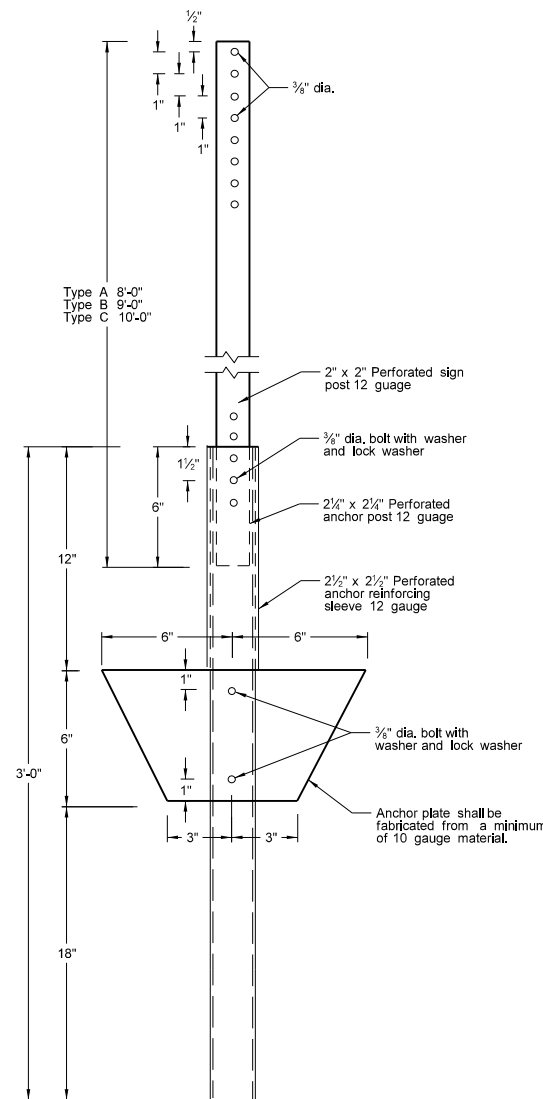
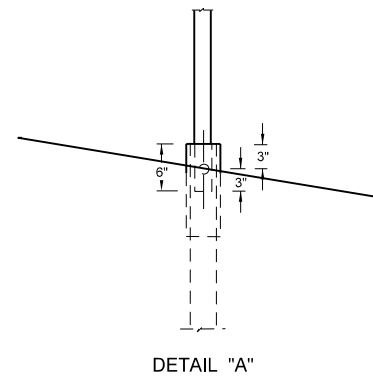
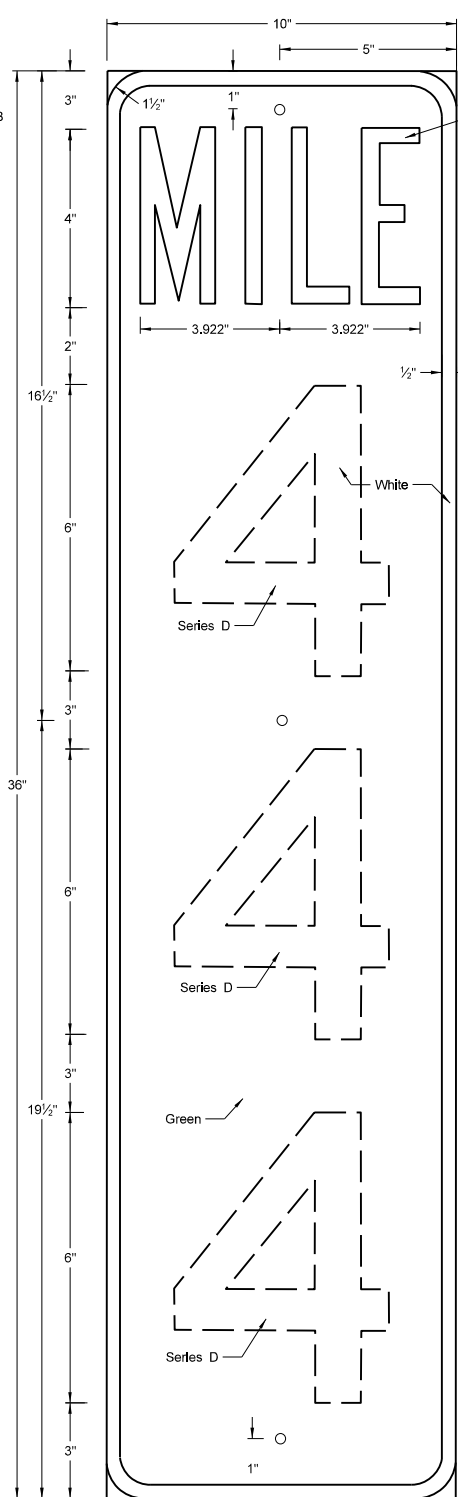
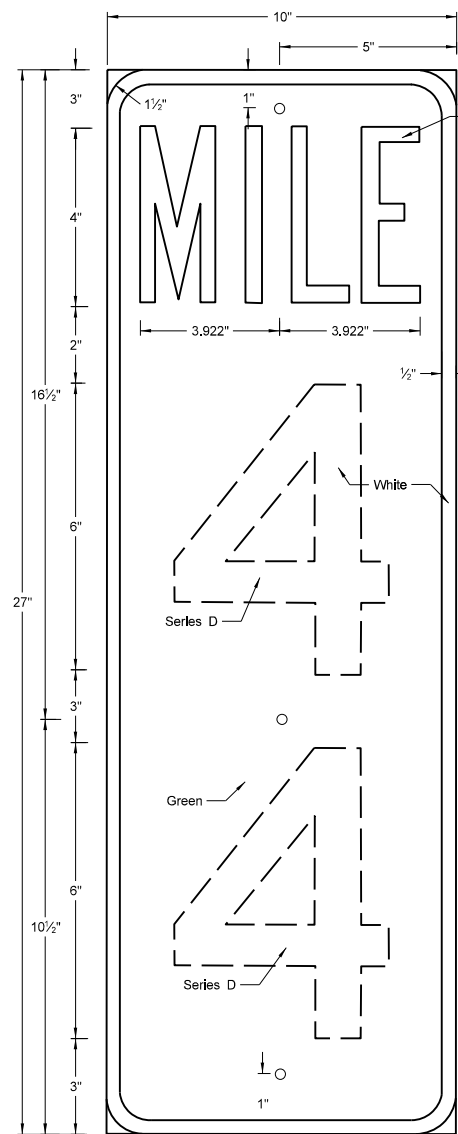
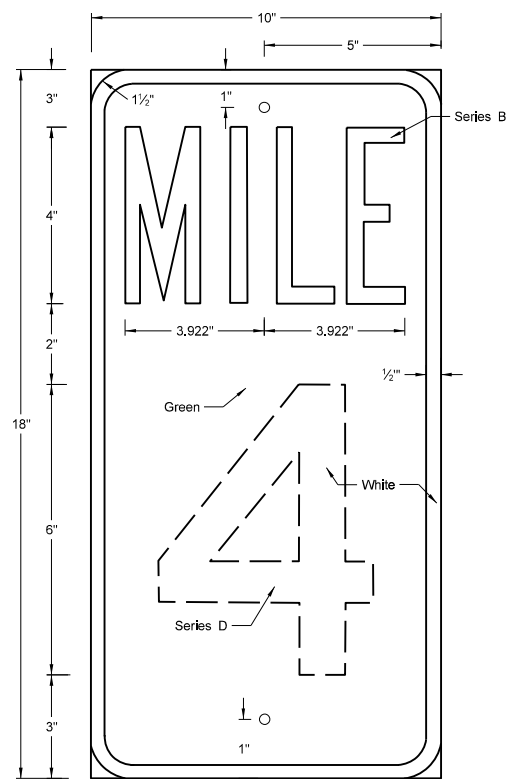
Fence Terminal Barbed Wire Fence

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-4-13	
REVISIONS	
DATE	CHANGE

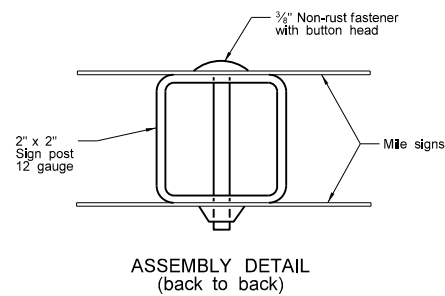
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(CONVENTIONAL USE) REFERENCE MARKERS

D-754-19

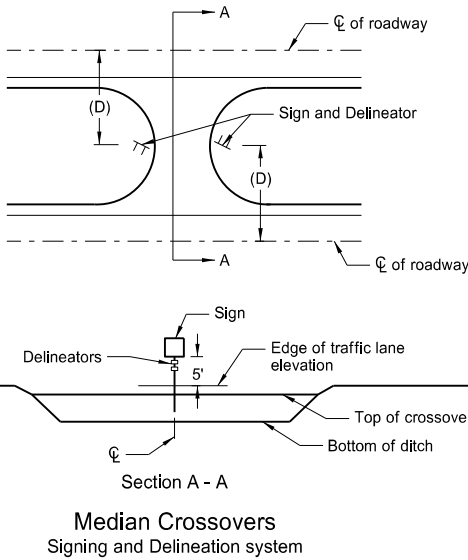
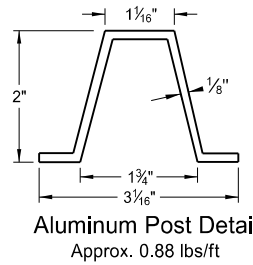
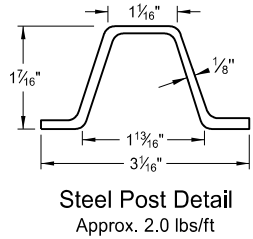
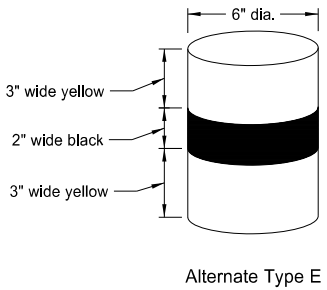
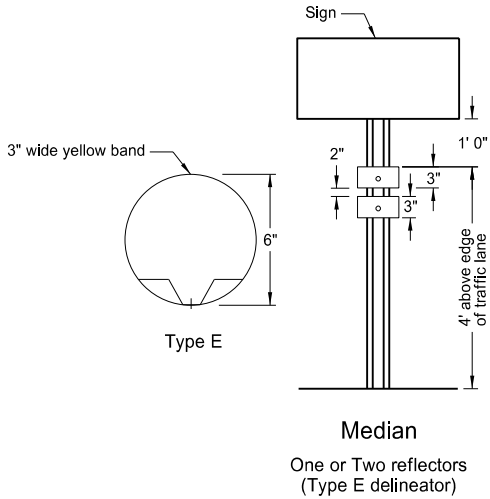
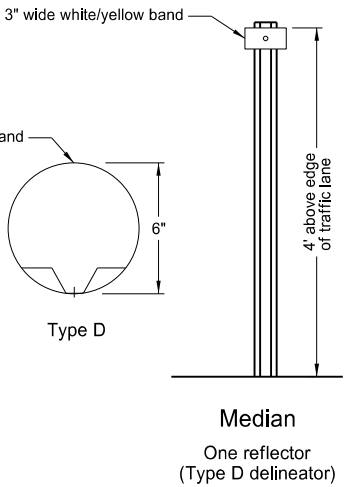
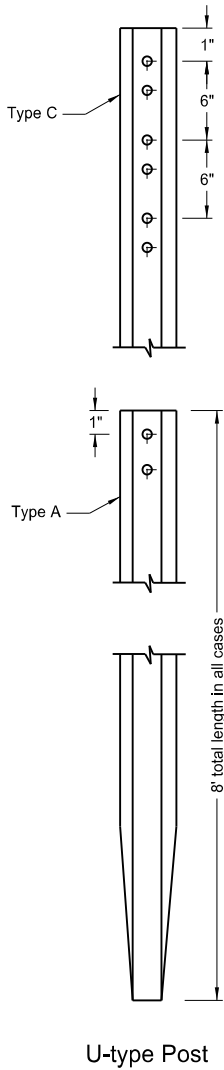
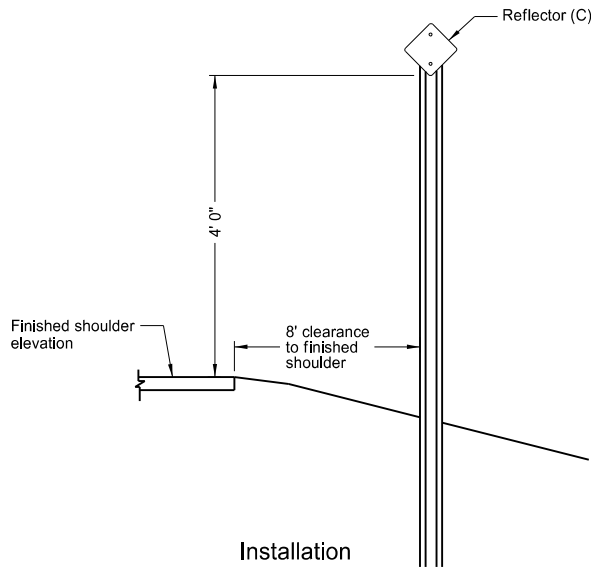
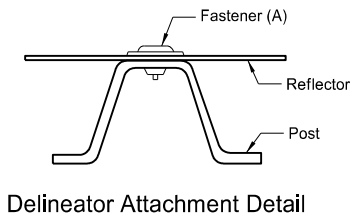
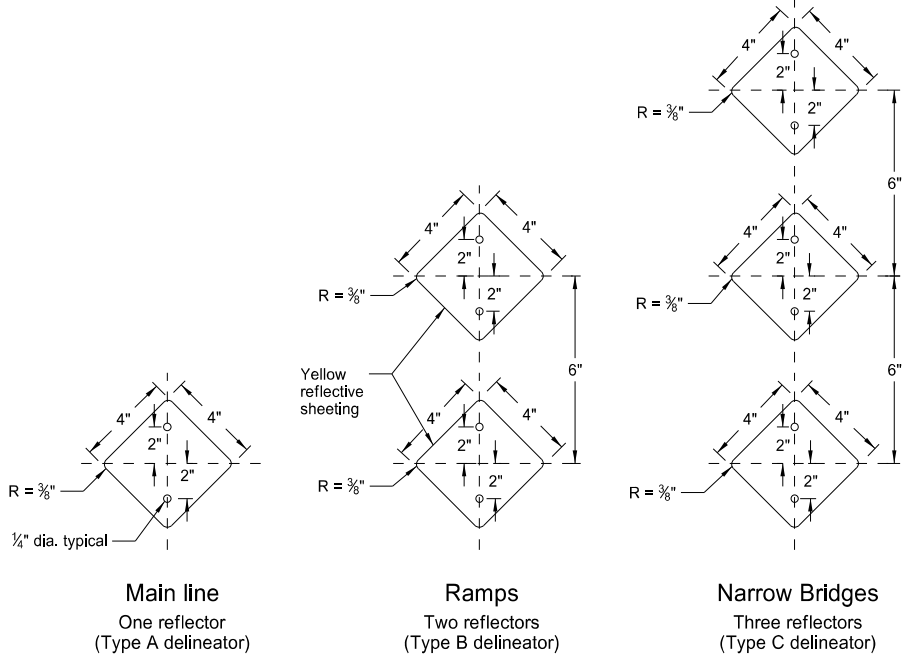


NOTES:
Installation: Posts shall be installed along right shoulder.
Sign: Backing shall be fabricated of 0.080 aluminum. Sheeting shall conform to section 894.01 of the Standard Specifications.
Posts: Posts shall conform to section 894.03 of the Standard Specifications.
Fasteners: The signs shall be attached to the post by tension pin type fastener or other suitable vandal resistant non-rust fastener.
Reflective Sheeting: Sheeting shall be Type IV.
Numbers: Numbers shall be of the series shown and may be screened or applied copy. Screening and reflective sheeting for applied copy shall conform to section 754 & 894 of the Standard Specifications.



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12-1-10		
REVISIONS		
DATE	CHANGE	
7-8-14	Revised post and reflective sheeting notes	

REFLECTORIZED DELINEATORS



- Delineator Details**
Type A, B, and C
- Installation:** Posts are to be installed along the right shoulder line unless shown otherwise on the plans.
- Reflectors:** Reflector shall be the same color as the adjacent pavement marking.
- Spacing:** Delineator spacing along main line tangents and curves with radius greater than 11500' (less than 0° 30') shall be at 528' centers. Curves with a radius less than 11500' but greater than 1200' the spacing shall be at 264' centers. With curves less than 1200' use spacing (S) = $3 \times \sqrt{R-50}$
- Type E**
- Alternate:** One unit band consisting of two yellow stripes separated by a 2" black stripe may be used in place of two 3" yellow bands.

- (A) The fastener shall be $\frac{3}{8}"$ dia. with flat washer having a min. outside dia. of $\frac{1}{2}"$. Fasteners shall be tension pin type or other non-rust vandal resistant fastener.
- (B) The contractor may drill only those holes required to attach the number of reflectors on that post, or drill all the posts the same so that any number of reflectors may be added.
- (C) Reflector to be mounted facing traffic at an angle of 93° away from oncoming traffic.
- (D) The median width may vary. The sign and delineator assembly shall be placed in the median crossover an equal distance from each roadway.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE
7-18-14	Revised reflective sheeting

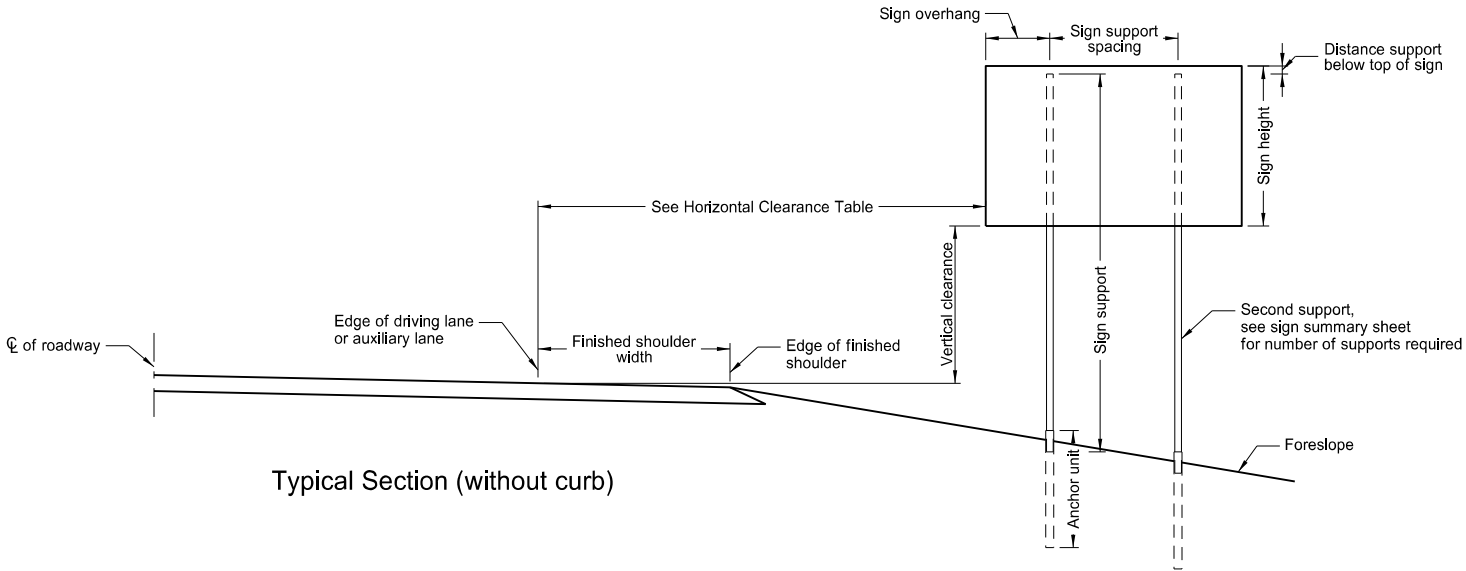
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PERFORATED TUBE ASSEMBLY DETAILS

D-754-23

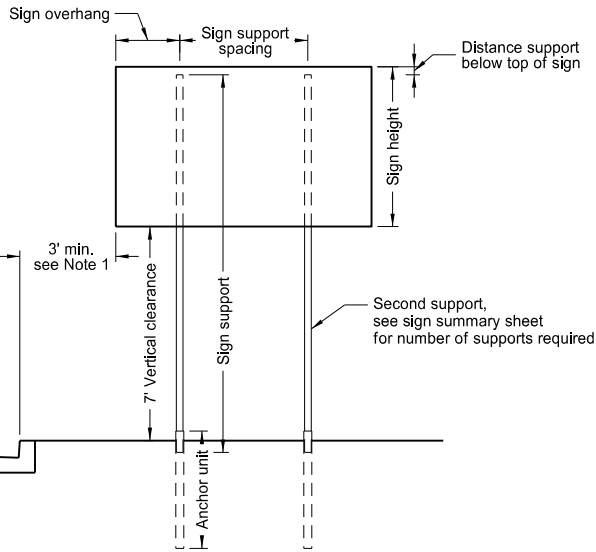
Notes:

- 1. Curbed Roadways: The clearance from the face of the curb should be 3' except where right of way or sidewalk width is limited, a minimum clearance of 2' shall be provided. The horizontal clearance may need to be increased to maintain a minimum sidewalk clear width of 4' from the sign support, not including any attached curb.
- 2. Minimum vertical clearance: Signs installed at the side of the road in rural districts shall be at least 5' measured from the bottom of the sign to the edge of the driving lane or auxiliary lane. Where parking or pedestrian movements occur, the clearance to the bottom of the sign shall be at least 7'.
- Signs on expressways shall be installed with a minimum height of 7'.
- Adopt-a-highway signs installed on Freeways shall be at least 7' above the edge of the driving lane.
- The vertical clearance shall have a maximum height of 6" above the vertical clearance specified above.
- 3. Offset signs: Where signs are placed at least 30 feet or more from the edge of the traveled way, the height to the bottom of such sign shall be 5' above the edge of the driving lane.
- 4. The clearance from edge of shared use path to edge of sign should be 3' except where width is limited, a minimum clearance of 2' shall be provided.

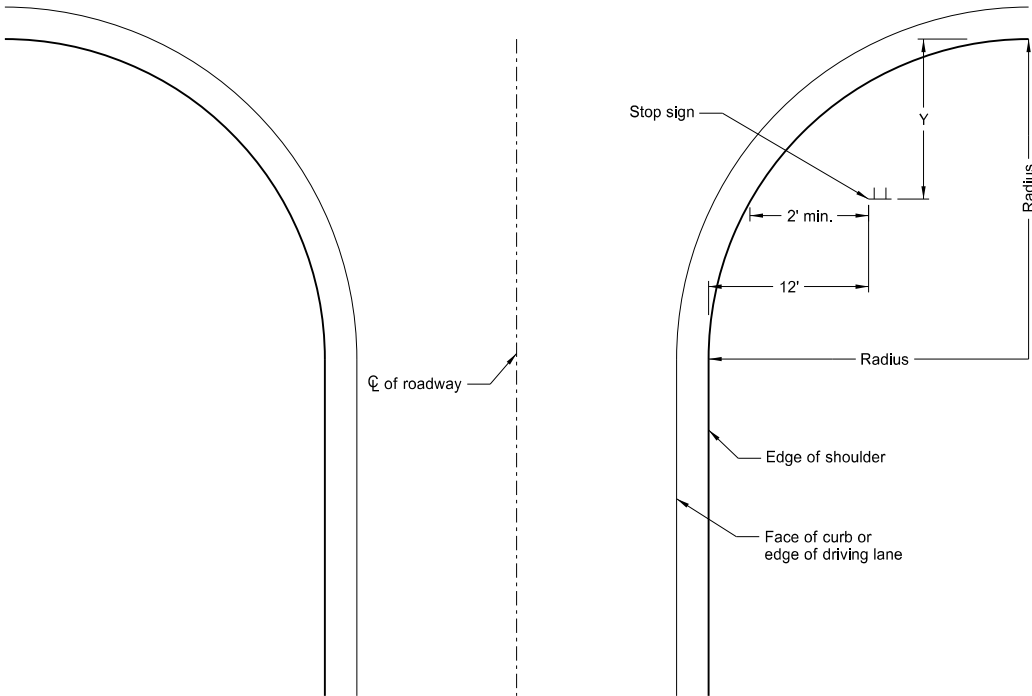


Typical Section (without curb)

Horizontal Clearance Table	
Shoulder Width ft	Offset ft
0 to 2	16
>2 to 4	18
>4 to 6	20
>6 to 8	22
>8 to 10	24



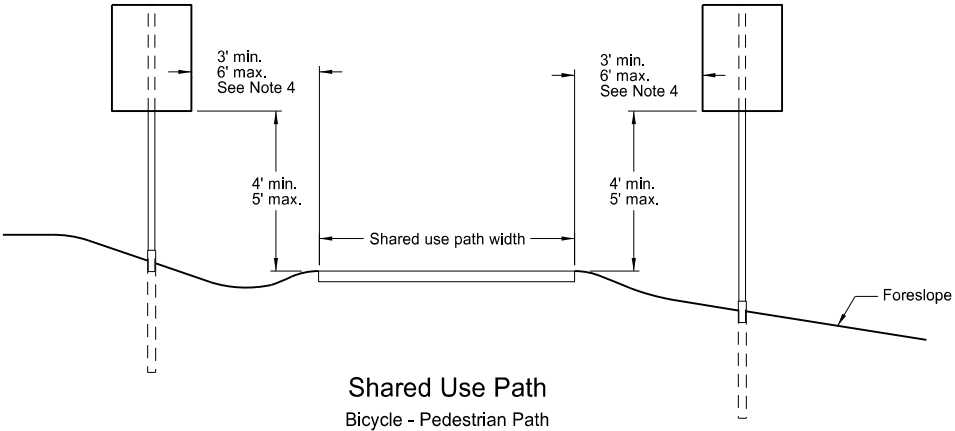
Typical Section (with curb)
Residential or Business District



Stop Sign Location
Wide Throat Intersection

This layout is to be used for the placement of "Stop" signs.

Radius ft.	Y-max. ft.	Y-min. ft.
40	50	15
45	50	18
50	50	21
55	50	25
60	50	28
65	50	32
70	50	35
75	50	39
80	50	43



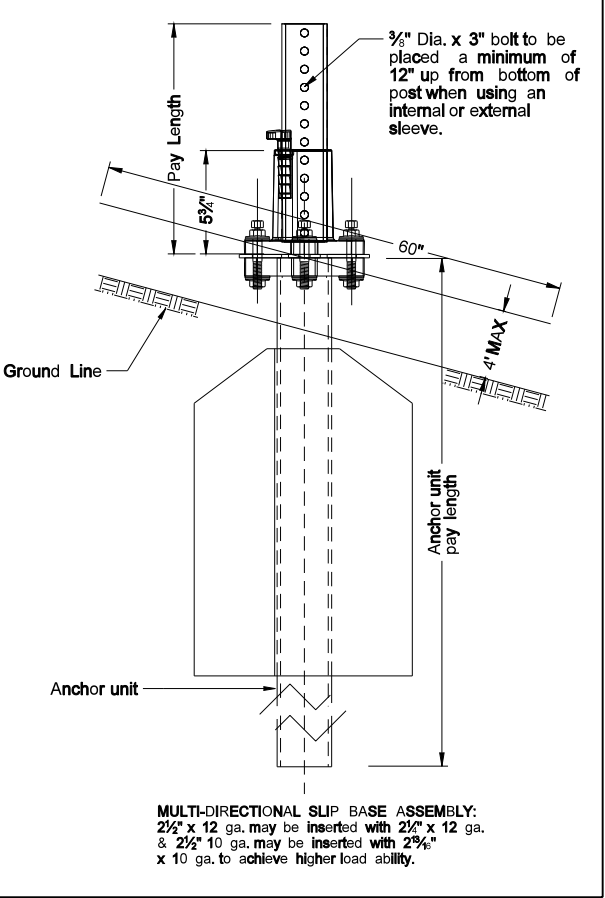
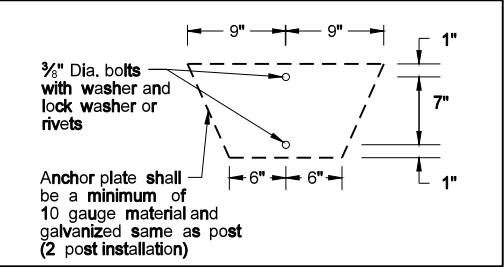
Shared Use Path
Bicycle - Pedestrian Path

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
7-8-14	Revised note 2, added note 4.

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Registration Number
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on 7/8/14 and the original document is stored at the
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of Transportation

Telescoping Perforated Tube							
Number of Posts	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thick-ness Gauge
1	2	12			No	2 1/2	12
1	2 1/2	12			No	2 1/2	12
1	2 1/2	12			(B)	3(C)	7
1	2 1/2	10			Yes		7
1	2 1/2	12	2 1/2(D)	12	Yes		7
1	2 1/2	12	2 1/2	12	Yes		7
2	2 1/2	10			Yes		7
2	2 1/2	12	2 1/2(D)	12	Yes		7
2	2 1/2	12	2 1/2	12	Yes		7
3 & 4	2 1/2	12			Yes		7
3 & 4	2 1/2	10			Yes		7
3 & 4	2 1/2	12	2 1/2	12	Yes		7
3 & 4	2 1/2	12	2 1/2(D)	12	Yes		7
3 & 4	2 1/2	10	2 1/2	10	Yes		7

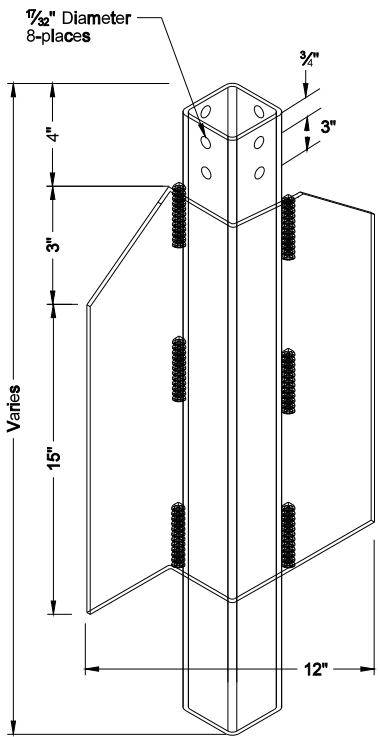
(B) - The 2 1/2", 12 gauge posts do not need breakaway bases when placed in standard soils, but require a shim as specified by the manufacturer. The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.
(C) - 3" anchor unit
(D) - 2 1/2" x 12 ga. x 18" minimum length external sleeve required.



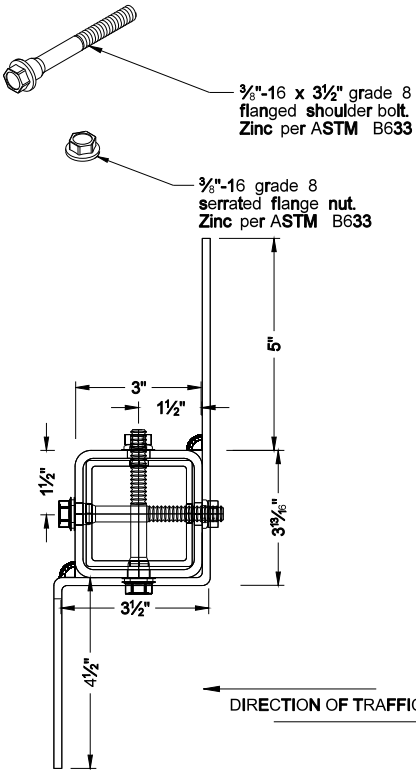
MULTI-DIRECTIONAL SLIP BASE ASSEMBLY:
2 1/2" x 12 ga. may be inserted with 2 1/2" x 12 ga.
& 2 1/2" 10 ga. may be inserted with 2 1/2" x 10 ga. to achieve higher load ability.

SHOULDER BOLT

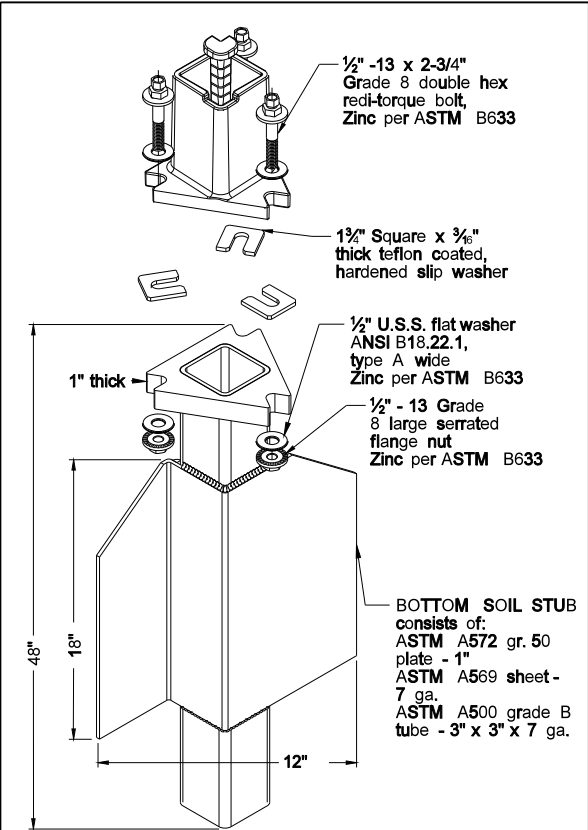
Shimming agent to reduce tolerance between 3" anchor unit and 2 1/2" post.
(standard 3/8" diameter grade 8 bolt may be used with proper shim)



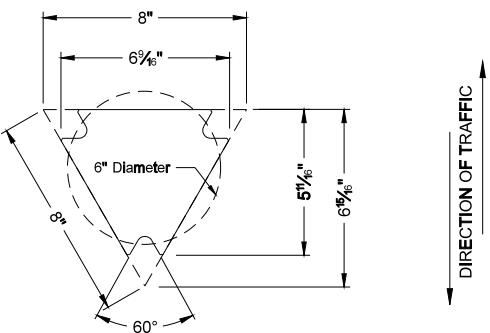
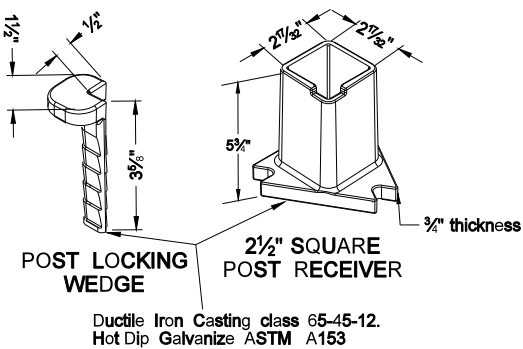
3" ANCHOR UNIT



Mounting Details Perforated Tube



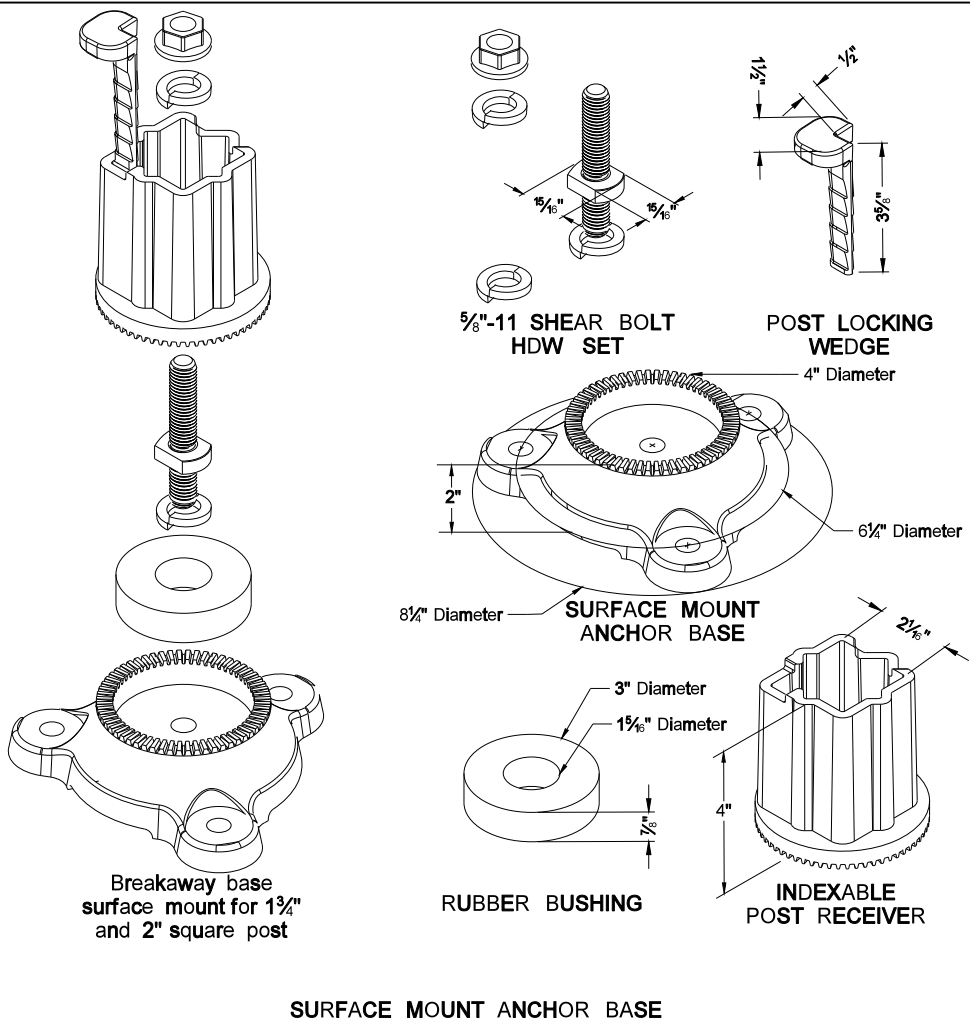
SLIP BASE FOR 2 1/2" POST



SLIP BASE DETAIL

Properties of Telescoping Perforated Tubes							
Tube Size In.	Wall Thickness In.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In. ⁴	Cross Sect. Area In. ²	Section Modulus In. ³	
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172	
2 x 2	0.105	12	2.416	0.372	0.590	0.372	
2 1/2 x 2 1/2	0.105	12	2.773	0.561	0.695	0.499	
2 3/4 x 2 3/4	0.135	10	3.432	0.605	0.841	0.590	
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643	
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.783	

The 2 3/4" size 10 gauge is shown as 2.19" size on the plans;
The 2 1/2" size is shown as 2.51" size on the plans.



SURFACE MOUNT ANCHOR BASE

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE

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Breakaway Coupler System
for Perforated Tubes

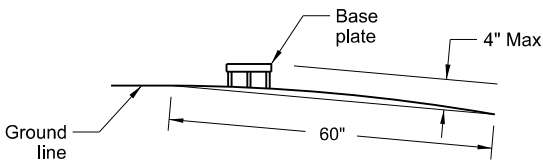
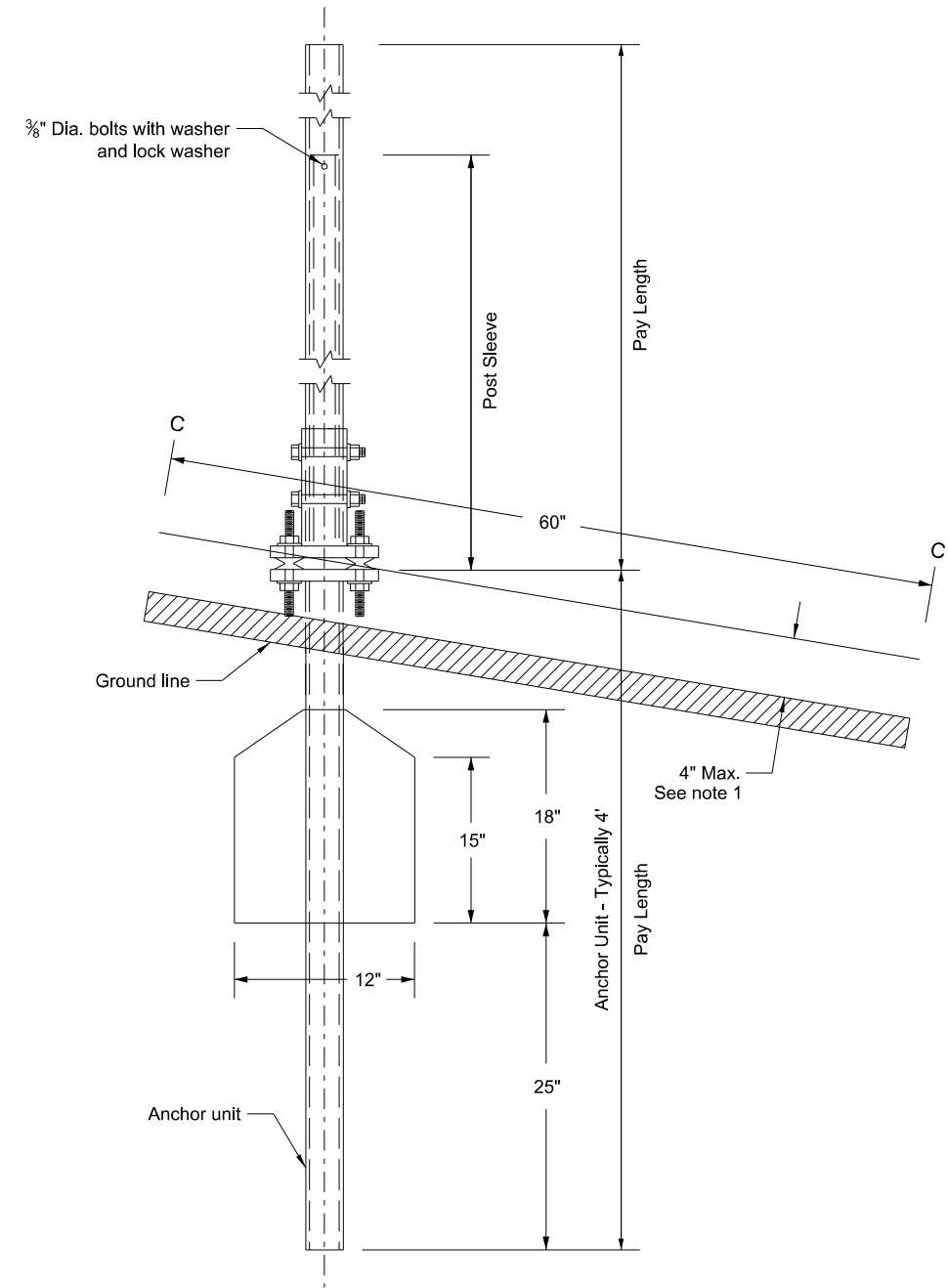
Notes:

- 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement shall be made above and below post location and also back and ahead of post.
- Anchor unit shall be the same size as the post and shall have the same specification as the post.
- Four post signs shall have over 8' between the first and fourth post.
- In lieu of the breakaway base system on standard D-754-24 the breakaway coupling system may be used. The breakaway coupler system shall be manufactured from material meeting the requirements of ASTM A325 fasteners with the special requirements as specified by DENT BREAKAWAY IND., INC. which meets the test requirements of NCHRP Report 350.

Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Guage
1	2	12			No	2¼	12
1	2¼	12			No	2½	12
1	2½	12			(B)	3(C)	7
1	2½	10			Yes		7
1	2¼	12	2	12	Yes		7
1	2½	12	2¼	12	Yes		7
2	2½	10			Yes		7
2	2¼	12	2	12	Yes		7
2	2½	12	2¼	12	Yes		7
3 & 4	2½	12			Yes		7
3 & 4	2½	10			Yes		7
3 & 4	2½	12	2¼	12	Yes		7
3 & 4	2¼	12	2	12	Yes		7
3 & 4	2½	10	2¾	10	Yes		7

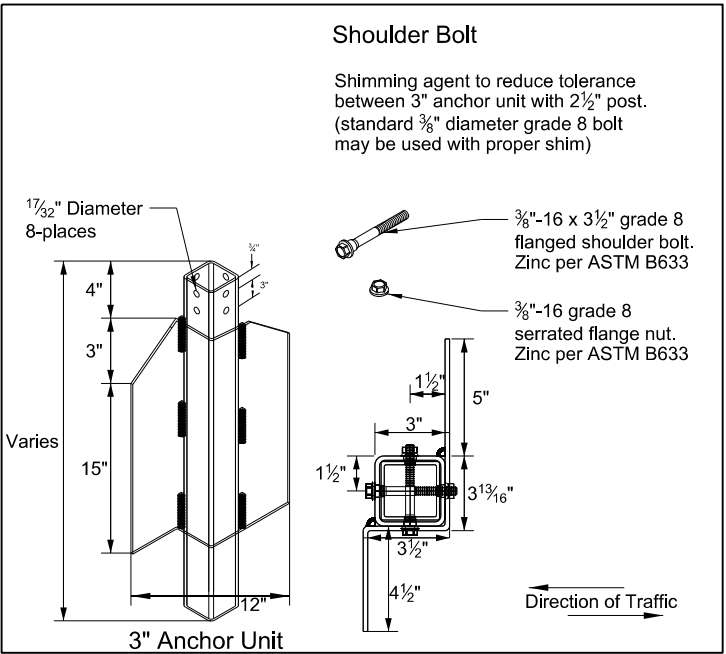
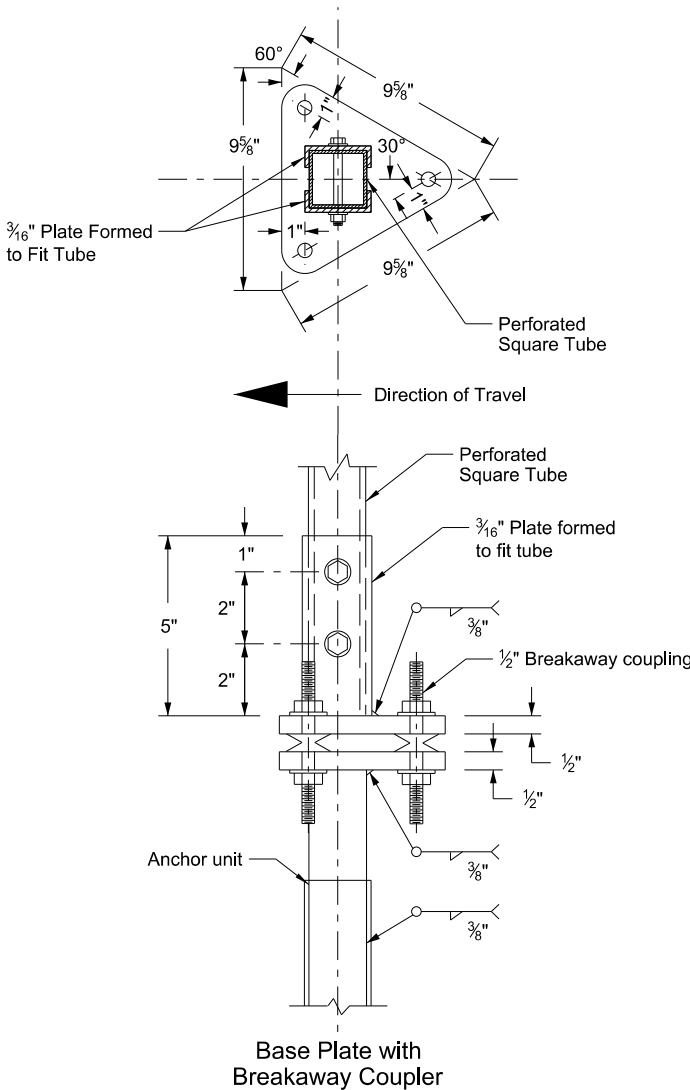
(B) - The 2½" 12 gauge posts do not need breakaway bases when placed in standard soils. The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.

(C) - 3" anchor unit



Section C-C

Max. protection of the stub post is 4" above a 60" chord aligned radially to the center line of the highway and connecting any point, within the length of the chord, on the ground surface on one side of the support to a point in the ground surface on the other side.

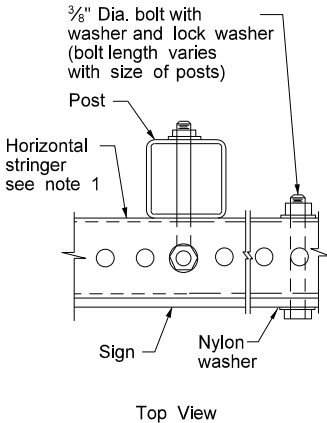
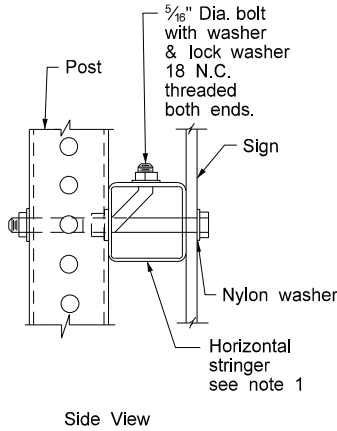


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-2013	
REVISIONS	
DATE	CHANGE

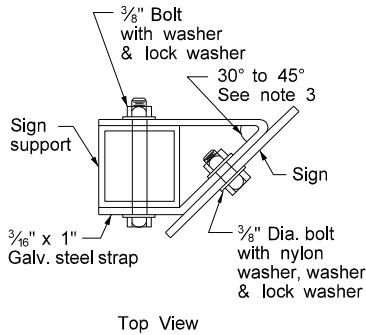
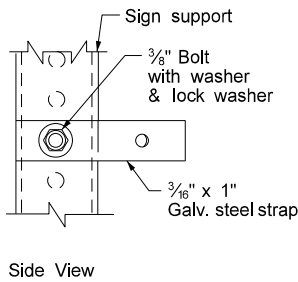
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Mounting Details Perforated Tube

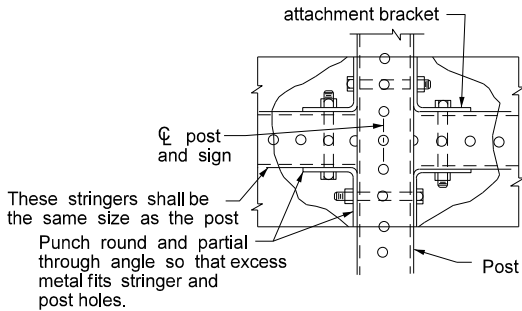
- Note:
- Horizontal stringers - In lieu of perforated tubes, the contractor may substitute z bar stringers. The z bar stringers shall be 1 3/4" x 3/16" thick, 1.08 lbs./ft aluminum or 3.16 lbs./ft steel.
 - Metal washers used on sign face shall have a minimum outside diameter of 5/16" ± 1/16" and 10 gauge thickness.
 - No Parking Signs: All no parking signs with directional arrows shall be placed at a 30 to 45 degree angle with the line of traffic flow. No parking signs required at the above angles may have the support turned to the correct angle. If the no parking sign is placed with another sign that has to be placed at a 90 degree angle with the line of traffic flow, the detailed angle strap should be used to mount the no parking sign. Flat washers and lock washers shall be used with all nylon washers.
 - In lieu of using the bent bolt to attach the post to the stringer, the contractor may choose to punch the sign backing and place the bolt through the sign, the stringer and the post.
 - 4" vertical clearance of anchor or breakaway base. The 4" x 60" measurement shall be made above and below post location and also back and ahead of post.



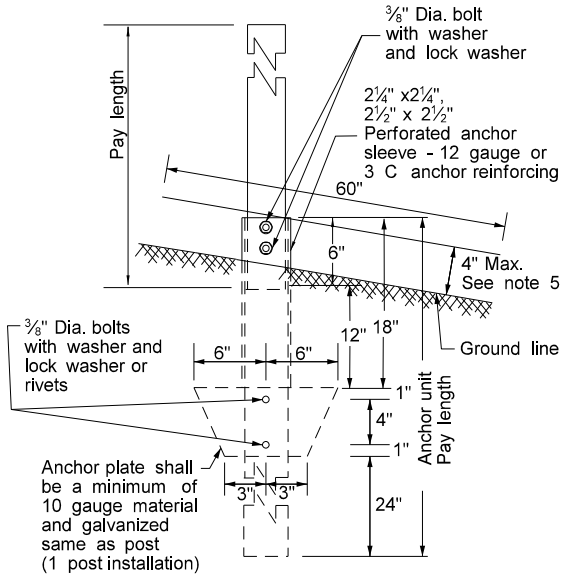
STRINGER MOUNTING
(WITH STRINGER IN FRONT OF POST)



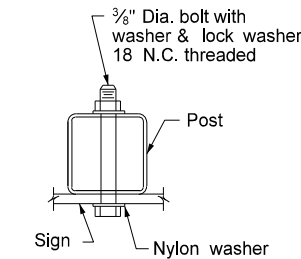
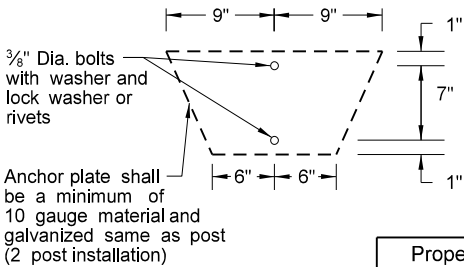
STRAP DETAIL



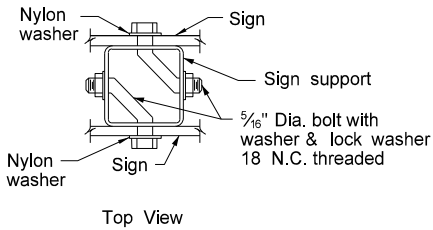
STREET NAME SIGNS
AND ONE WAY SIGNS
SINGLE POST ASSEMBLY
ONE STRINGER OR
BACK TO BACK MOUNTING



ANCHOR UNIT AND
POST ASSEMBLY



BOLT MOUNTING



BACK TO BACK
MOUNTING

Properties of Telescoping Perforated Tubes							
Tube Size In.	Wall Thickness In.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In. ⁴	Cross Sect. area In. ²	Section Modulus In. ³	
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172	
2 x 2	0.105	12	2.416	0.372	0.590	0.372	
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499	
2 3/16 x 2 3/16	0.135	10	3.432	0.605	0.841	0.590	
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643	
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.783	

The 2 3/16" size 10 gauge is shown as 2.19" size on the plans.
The 2 1/2" size is shown as 2.51" size on the plans.

Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thick-ness Gauge
1	2	12			No	2 1/4	12
1	2 1/4	12			No	2 1/2	12
1	2 1/2	12			(B)	3(C)	7
1	2 1/2	10			Yes		7
1	2 1/4	12	2 1/2(D)	12	Yes		7
1	2 1/2	12	2 1/4	12	Yes		7
2	2 1/2	10			Yes		7
2	2 1/4	12	2 1/2(D)	12	Yes		7
2	2 1/2	12	2 1/4	12	Yes		7
3 & 4	2 1/2	12			Yes		7
3 & 4	2 1/2	10			Yes		7
3 & 4	2 1/2	12	2 1/4	12	Yes		7
3 & 4	2 1/4	12	2 1/2(D)	12	Yes		7
3 & 4	2 1/2	10	2 3/16	10	Yes		7

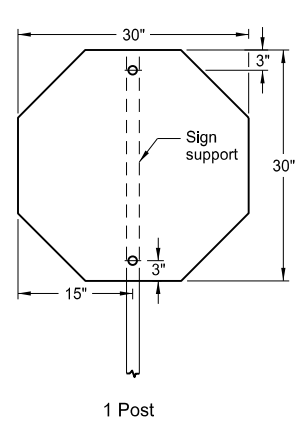
(B) - The 2 1/2", 12 gauge posts do not need breakaway bases when placed in standard soils, but require a shim as specified by the manufacturer. The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.
(C) - 3" anchor unit
(D) - 2 1/2" x 12 ga. x 18" minimum length external sleeve required.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-8-09	
REVISIONS	
DATE	CHANGE
7-8-14	Revised Note 3

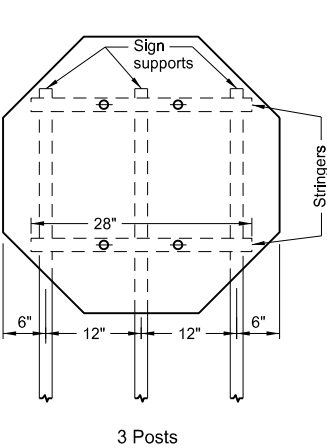
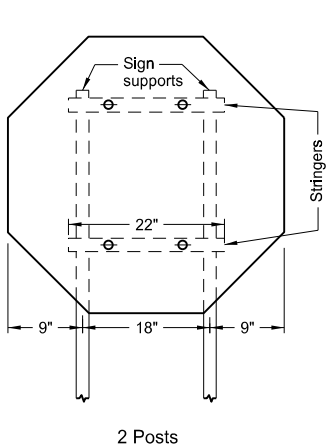
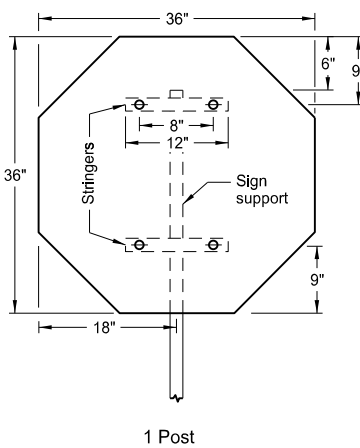
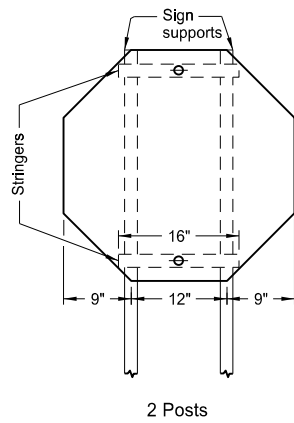
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SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS

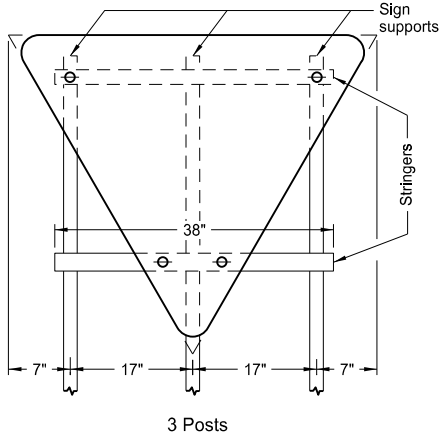
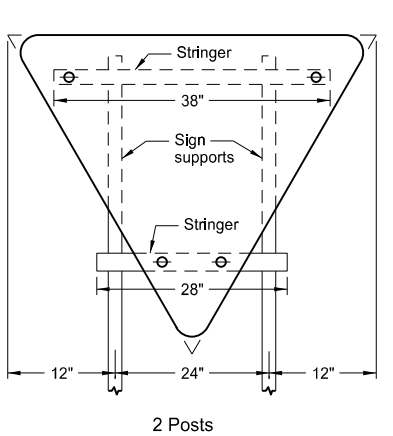
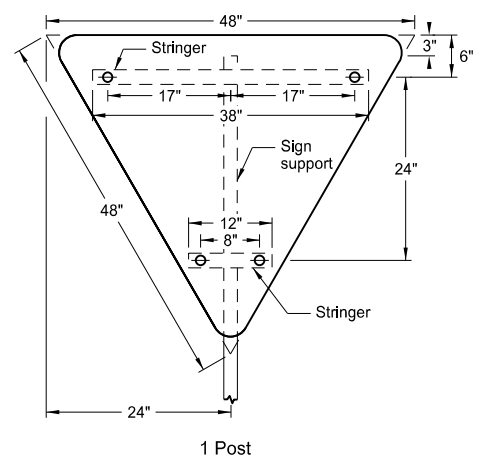
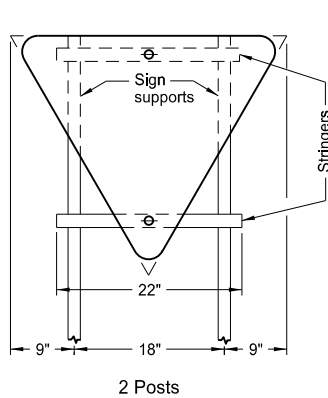
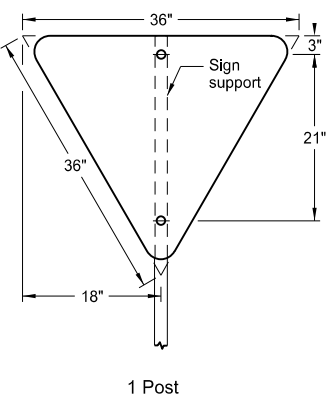
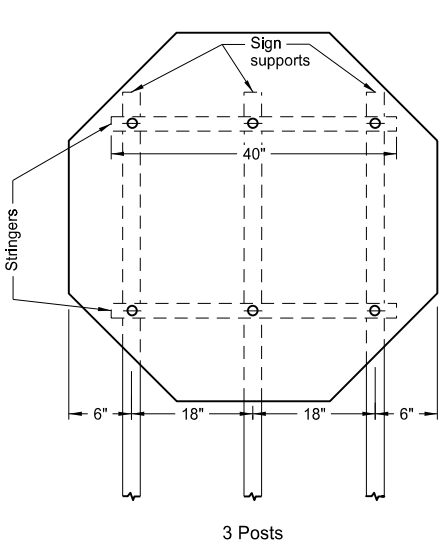
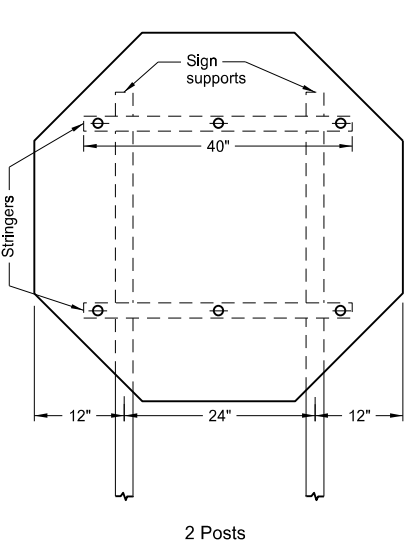
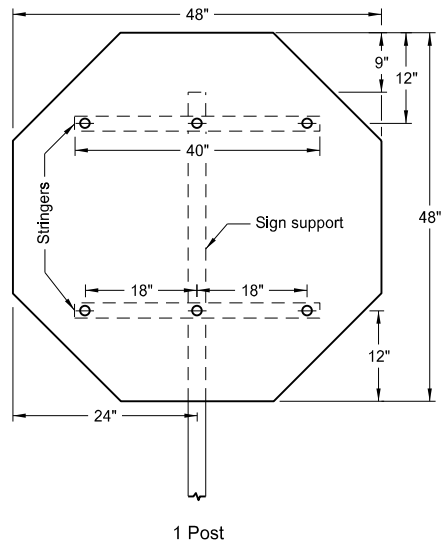
D-754-26



Assembly No. 1



- Notes:
1. See Standard D-754-25 for mounting details.
 2. The minimum sign backing material thickness shall be 0.100 inch.
 3. Perforated square tube stringer shall be 1½" x 1½".
 4. All holes shall be punched round for ⅜" bolt.



Assembly No. 4

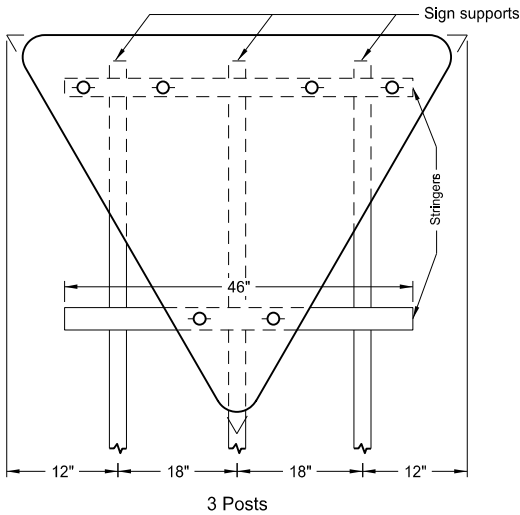
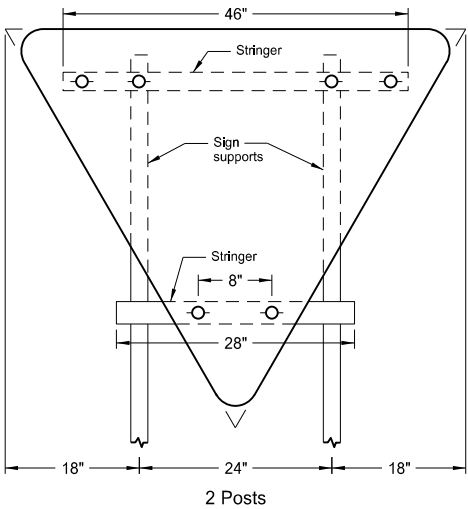
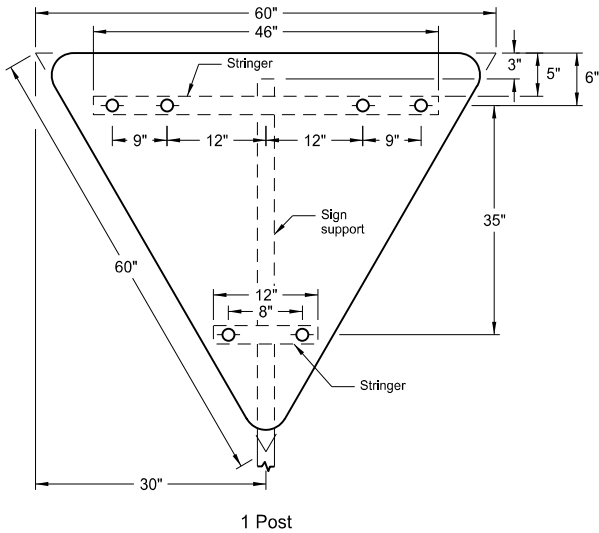
Assembly No. 3

Assembly No. 5

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE

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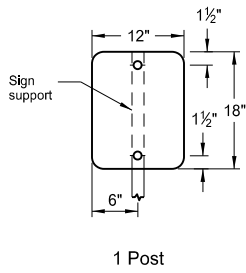
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS



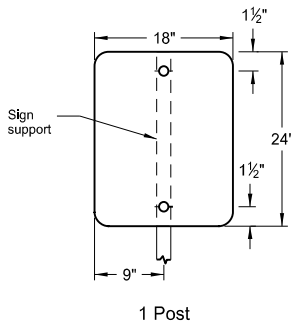
Assembly No. 6

Notes:

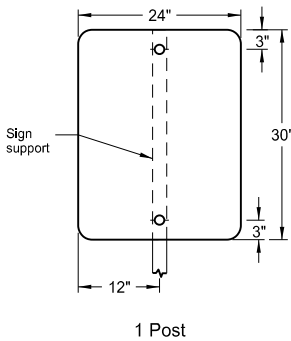
1. See Standard D-754-25 for mounting details.
2. The minimum sign backing material thickness shall be 0.100 inch.
3. Perforated square tube stringer shall be 1½" x 1½".
4. All holes shall be punched round for ⅜" bolt.



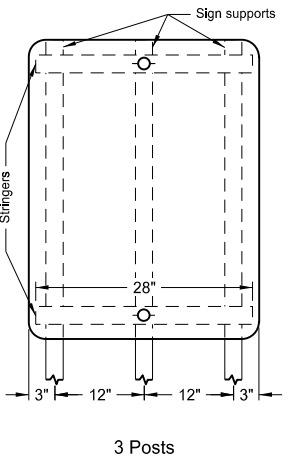
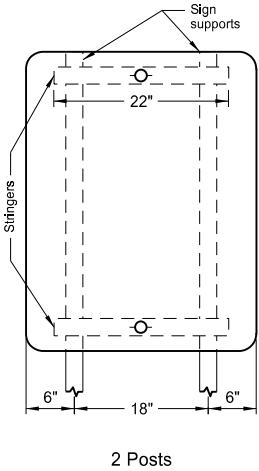
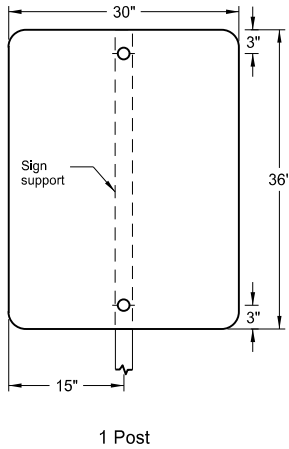
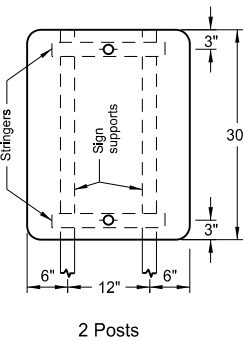
Assembly No. 7



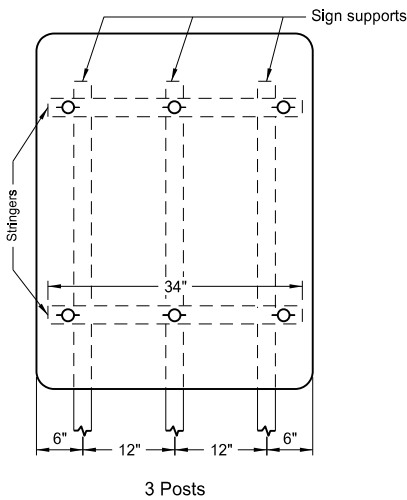
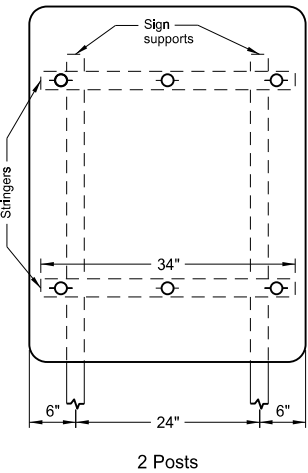
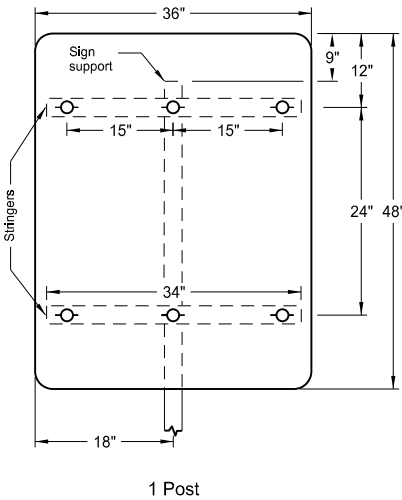
Assembly No. 8



Assembly No. 9



Assembly No. 10



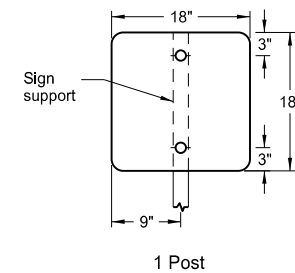
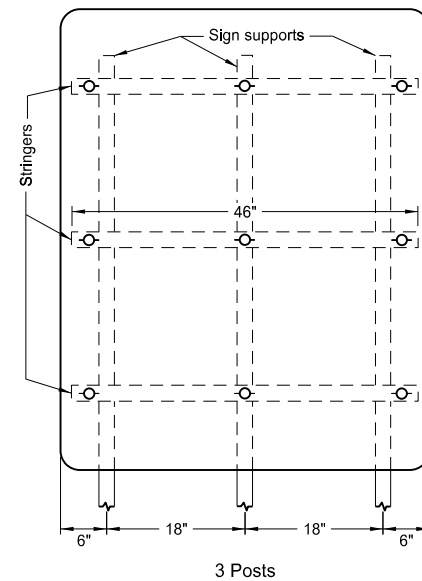
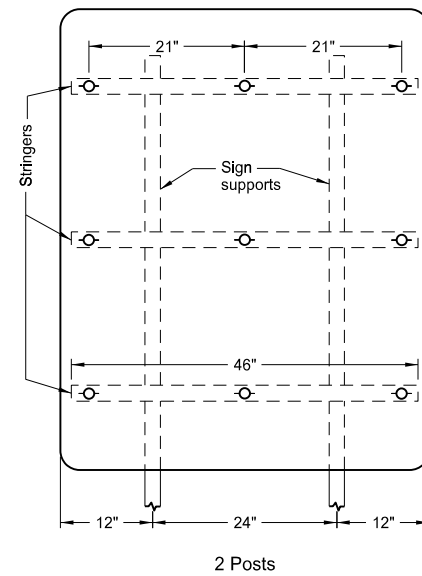
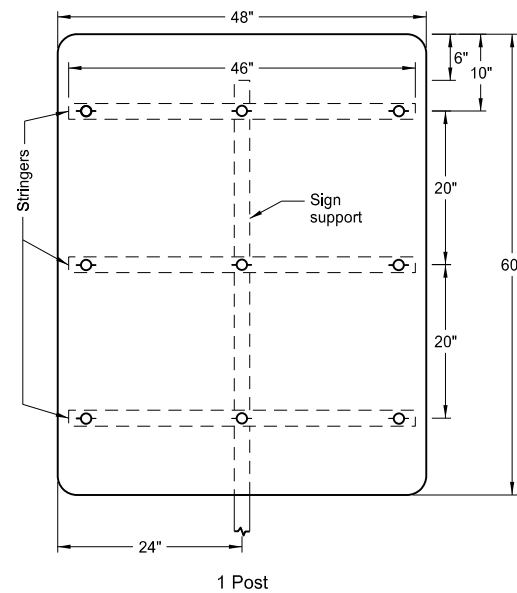
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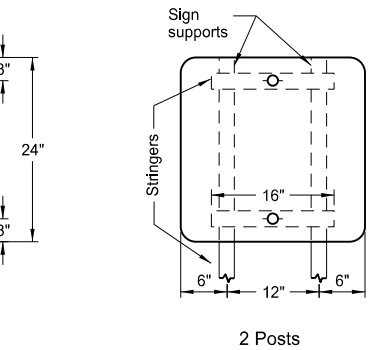
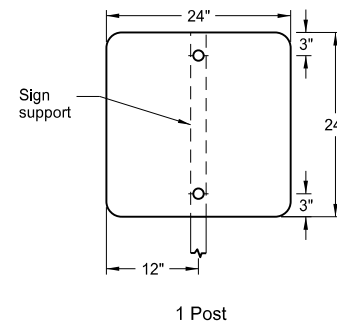
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SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS

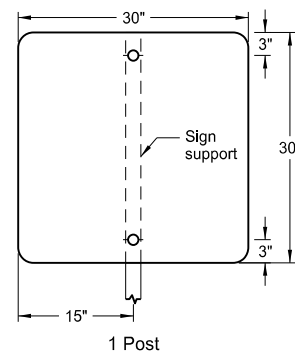
D-754-28



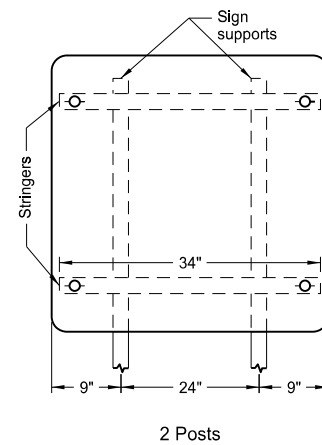
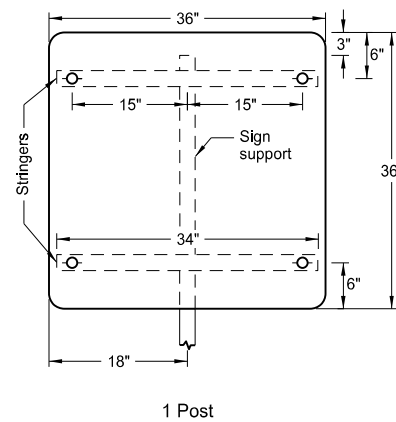
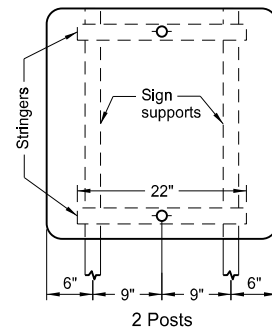
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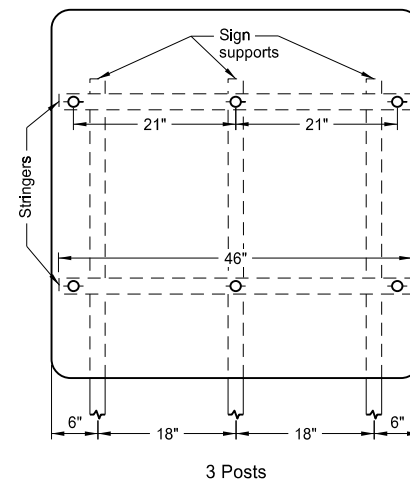
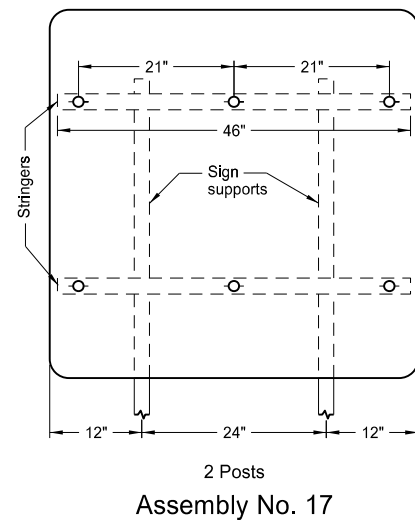
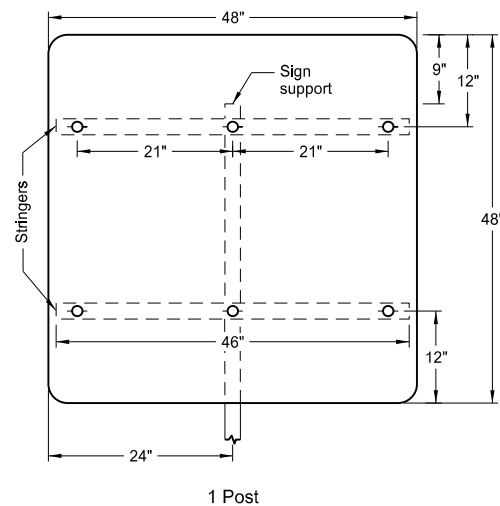
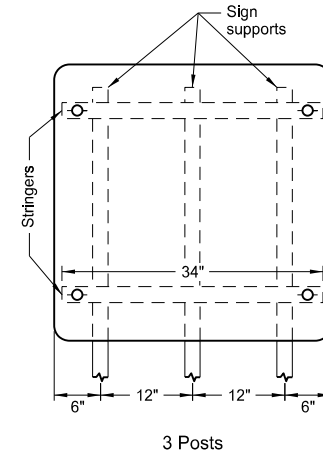
Assembly No. 14



Assembly No. 15



Assembly No. 16



Assembly No. 17

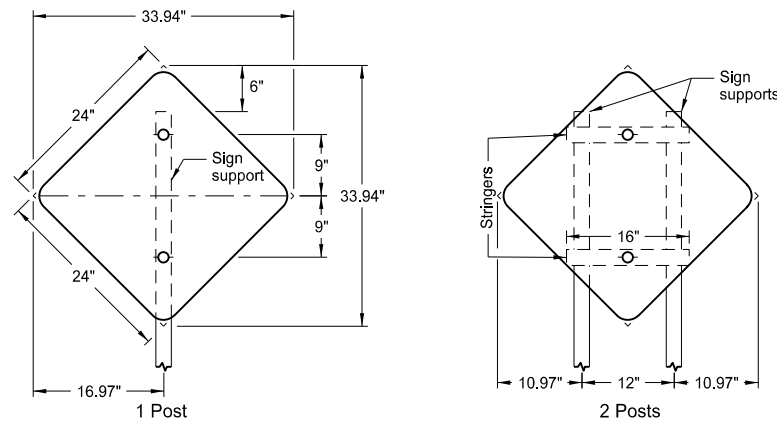
Notes:

1. See Standard D-754-25 for mounting details.
2. The minimum sign backing material thickness shall be 0.100 inch.
3. Perforated square tube stringer shall be 1½" x 1½".
4. All holes shall be punched round for ⅜" bolt.

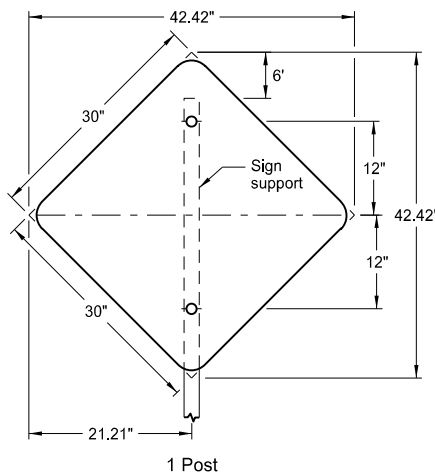
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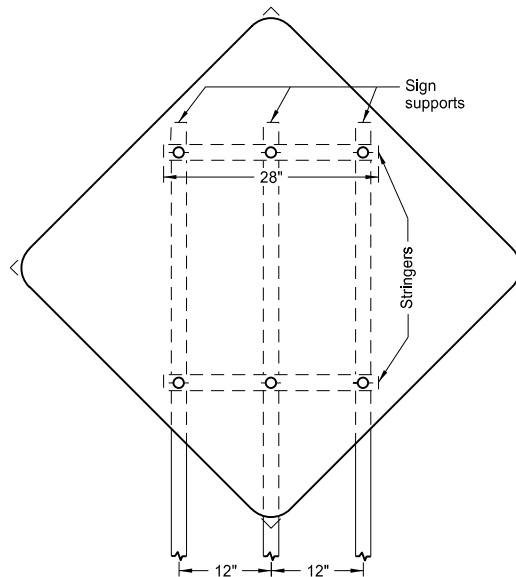
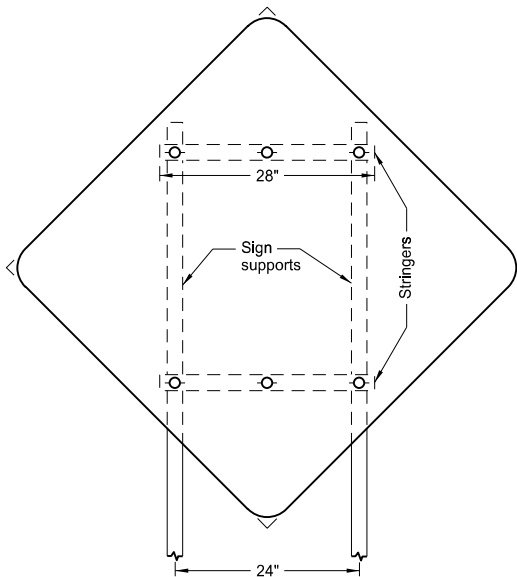
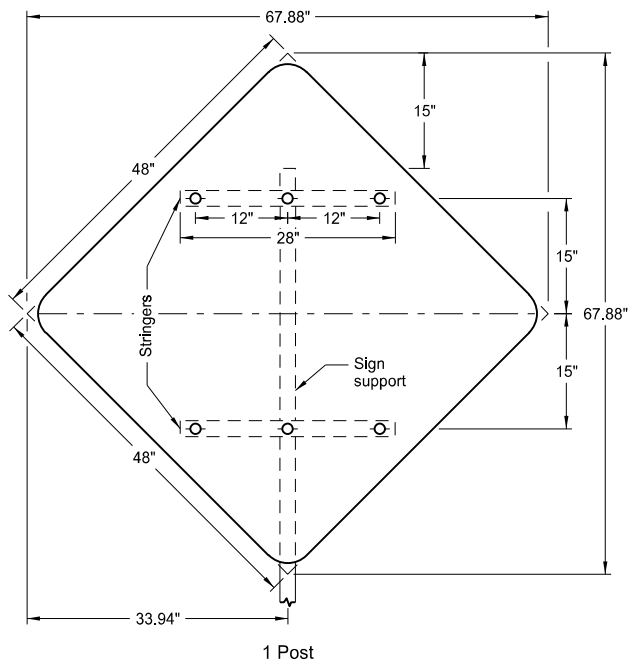
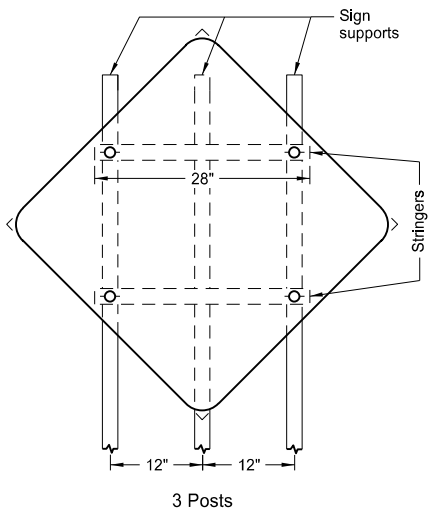
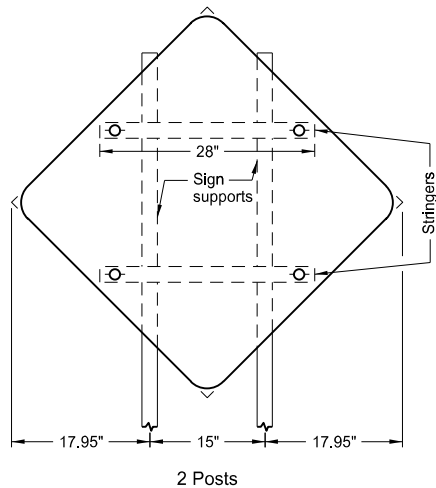
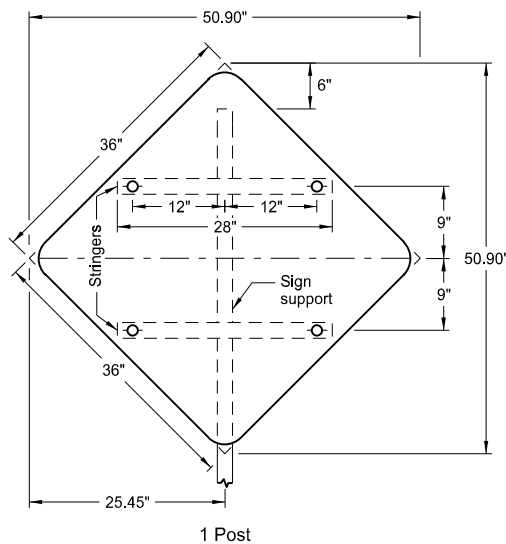
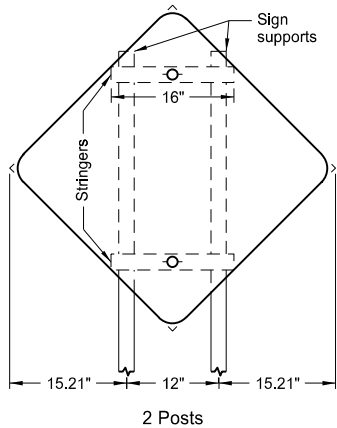
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS



Assembly No. 18



Assembly No. 19



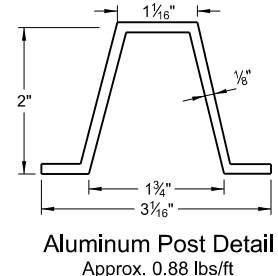
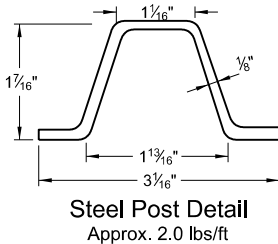
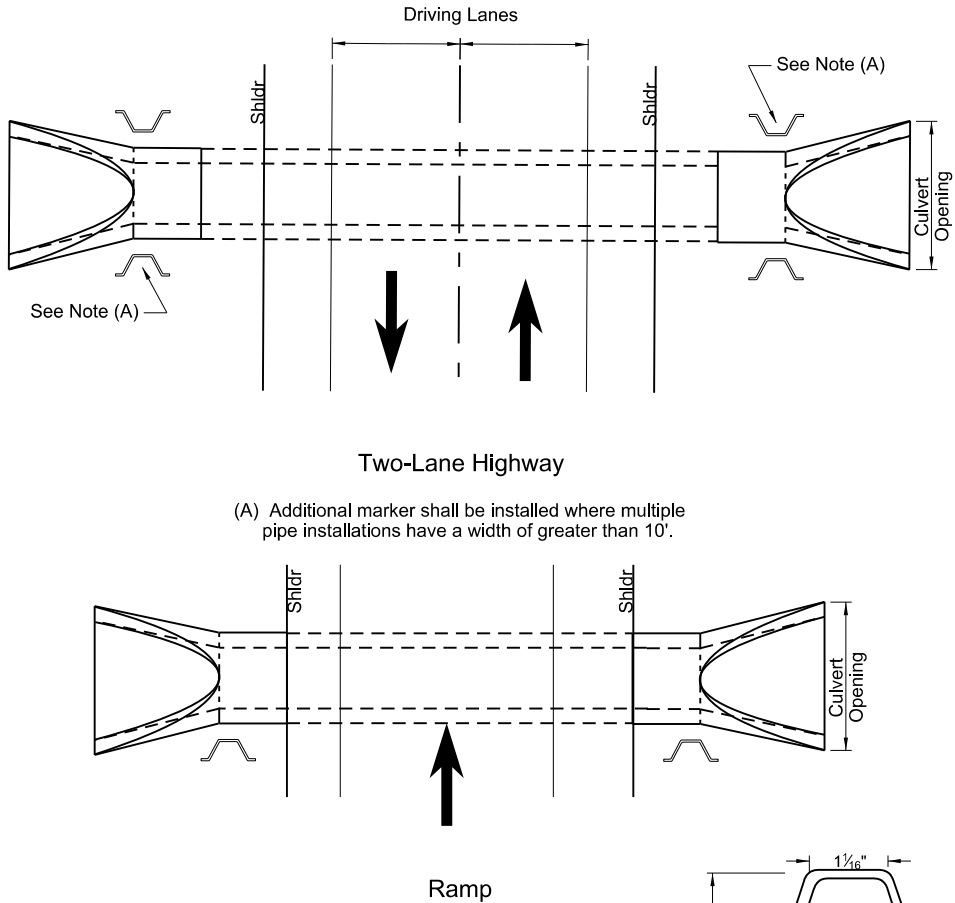
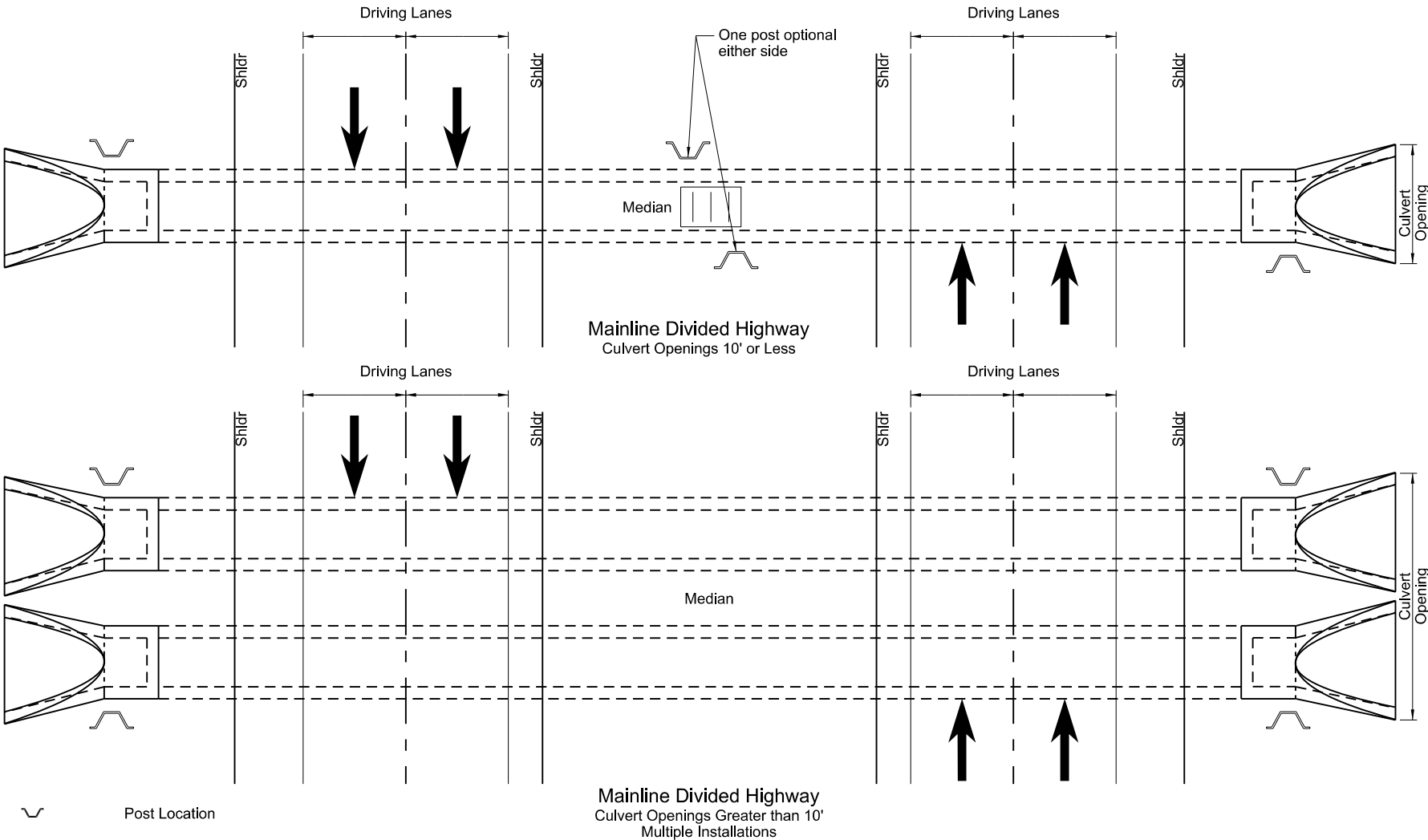
- Notes:
1. See Standard D-754-25 for mounting details.
 2. The minimum sign backing material thickness shall be 0.100 inch.
 3. Perforated square tube stringer shall be 1½" x 1½".
 4. All holes shall be punched round for ⅜" bolt.

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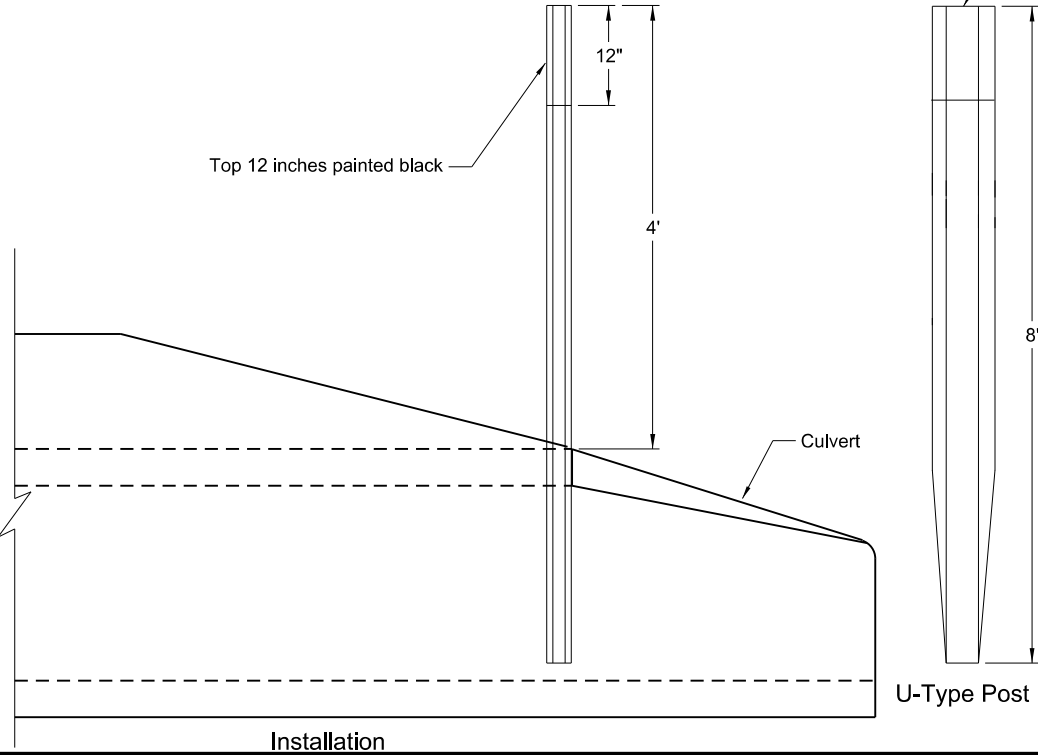
OBJECT MARKERS - CULVERTS

D-754-83



Notes:

- Installation: Construction requirements shall meet 754.04D. Each end of culverts crossing the roadway within the right-of-way shall be marked with a post as shown. Posts are to be installed in front of the culvert in the direction of travel along the side of the culvert and one foot from the culvert opening unless shown otherwise on the plans.
- Posts: Posts shall conform to section 894.04A of the Standard Specifications with the exception that the post may or may not have holes drilled.
- Basis of Payment: The quantity will be measured by the number of object markers each installed. All costs for furnishing and installing the markers shall be included in the price bid for the item "Object Markers - Culverts".



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-05-13	
REVISIONS	
DATE	CHANGE
7-7-14	Revised Notes

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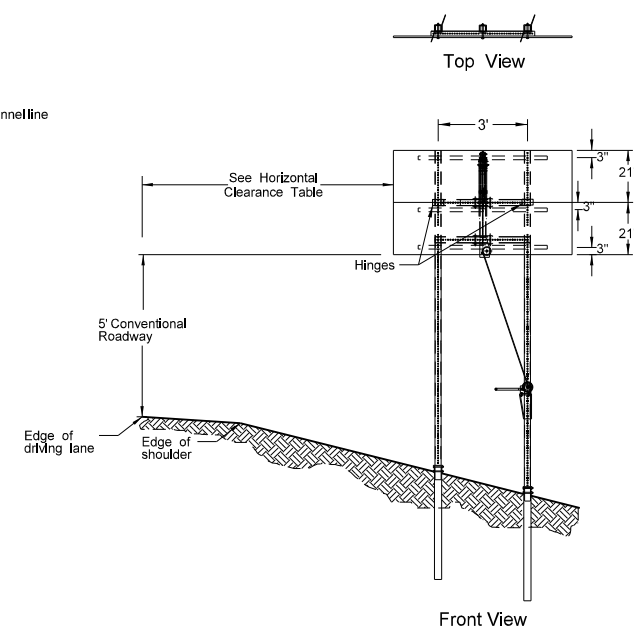
D-754-85

Diagram of a rectangular traffic sign with dimensions and text:

- Overall width: 6'-0"
- Overall height: 7'-5"
- Text: ALL TRUCKS MUST ENTER NEXT LEFT
- Vertical dimensions on the right side (from top to bottom):
 - 7'-5"
 - 6"EM
 - 4'-5"
 - 6"EM
 - 4'-5"
 - 6"EM

Diagram of a "NEXT LEFT" sign with dimensions. The sign is 57.7 inches wide and 18.5 inches high. The text "NEXT LEFT" is centered. Dimensions for letter placement are given: 7.15 inches from the left and right edges to the letter "N" and "T" respectively, and 4.5 inches from the top edge to the top of the letters. The sign is 6 inches from the top edge of the panel and 7.5 inches from the bottom edge of the panel.

PANEL STYLE:																		
LETTER POSITION (X)															LENGTH	SIZE	SERIES	
A	L	L		T	R	U	C	K	S									
7.2	14.3	19.7	24.2	30.2	35.7	41.8	48.1	54.3	60							57.7	6	EM 2000
M	U	S	T		E	N	T	E	R							57.5 <td>6</td> <td>EM 2000</td>	6	EM 2000
7.3	14.6	20.9	26.7	31.1	37.1	42.8	48.8	54.3	60									
N	E	X	T			L	E	F	T							48.8 <td>6</td> <td>EM 2000</td>	6	EM 2000
11.7	18.2	23.5	29.4	33.8	39.8	45.2	50.9	56										



HORIZONTAL CLEARANCE TABLE	
SHOULDER WIDTH (FT)	OFFSET (FT)
0 to 2	16
>2 to 4	18
>4 to 6	20
>6 to 8	22
>8 to 10	24

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
09-27-13	
REVISIONS	
DATE	CHANGE
06-27-14	Added winch to the hinged sign detail

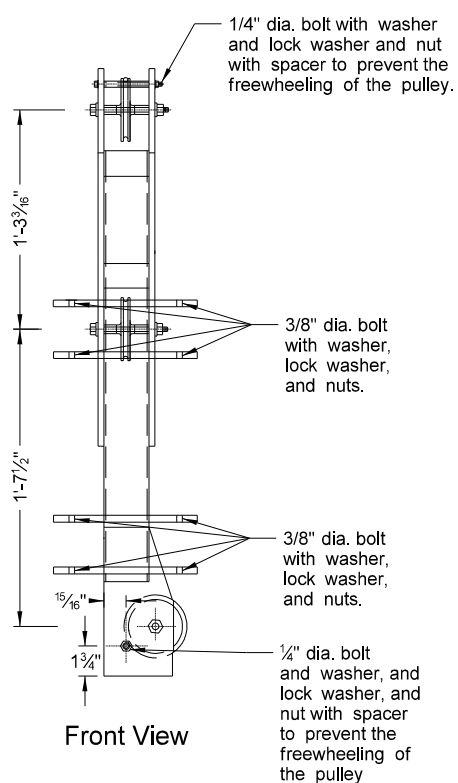
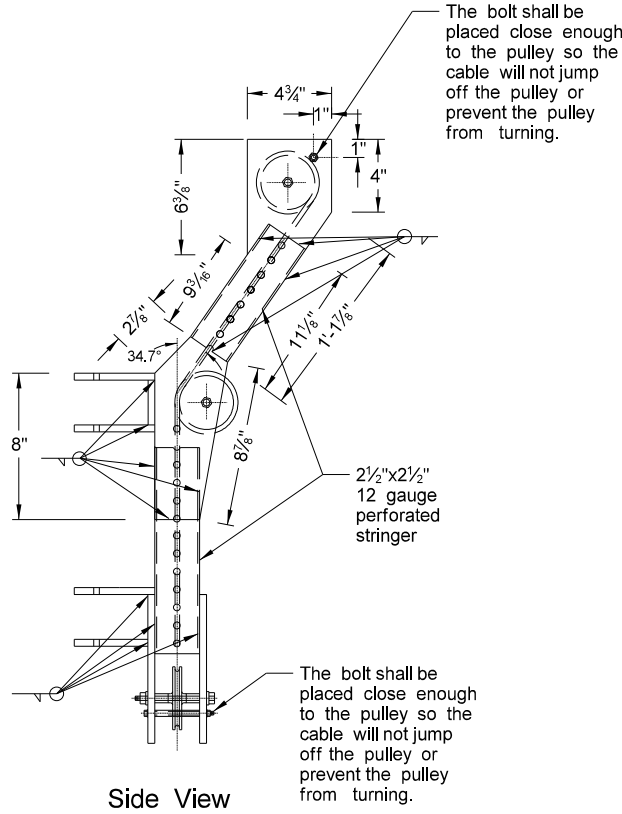
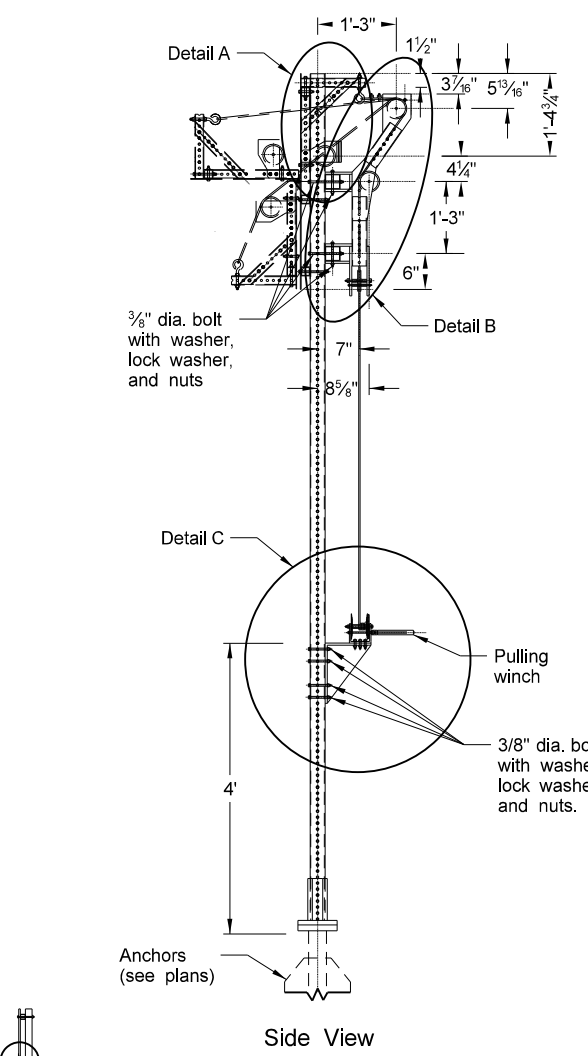
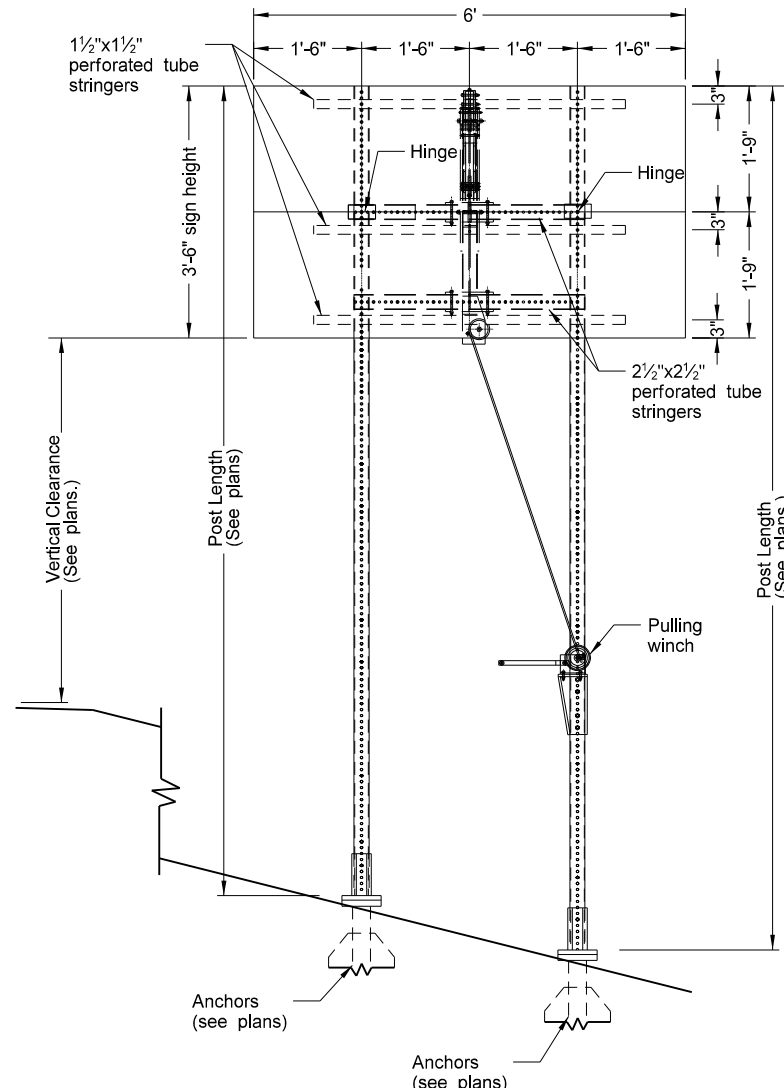
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NOTES:

The assembly for the supports are shown on
Standard Drawing D-754-24, 24A, and 25.

Winch and hinge details are shown on Standard Drawing D-754-85A.

TRUCK INSPECTION ROADSIDE SITE
PULLEY WINCH FOR 6' X 3.5' SIGN



Detail B

Notes:

The minimum sign backing material thickness shall be 0.100 inch.

All holes shall be punched round for 3/8" bolt.

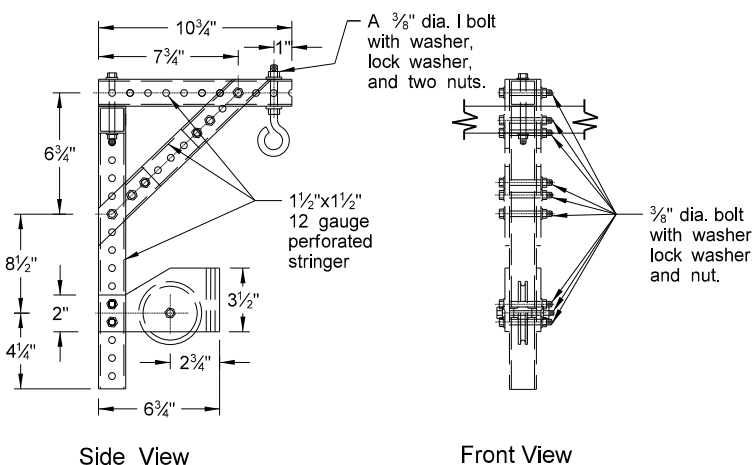
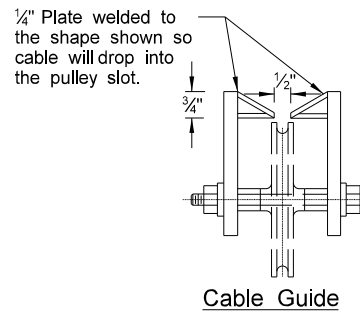
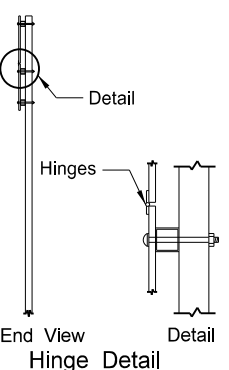
Pulling Winch: Winch shall be built for lifting and pulling operations with a self locking mechanism. The winch and cable attachment shall comply with SAE Standard J1853 and be mounted using three 3/8" diameter bolts, washers and lock washers.

Gears shall be laminated, high carbon steel. Gears shall be arc welded and drive gears shall be copper brazed. Reel shall be rigid welded construction for added strength. The reel shall be free wheeling when the ratchet is disengaged. Gear ratio shall be matched for easy cranking. Finish shall be zinc plated. Handle shall be heavy duty steel with molded grips. Base shall be embossed reinforced steel. All drive shafts shall have permanently lubricated bearings. A cable clamp shall be included. Pulling winch shall have the large hub for use with the cable operation.

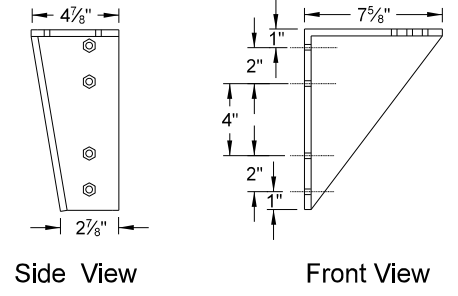
Attachment hardware for the pulling winch and pulleys shall be 3/8" thick steel plate conforming to AASHTO M270 Grade 36 and galvanized in conformance with ASTM A153. Pulleys shall be approximately 3" in diameter plus a 3/8" diameter for the cable ride. Pulleys shall have spacers between the hub and the attachment brackets so they will ride in the center of the brackets without moving back and forth. Bolts, nuts and washers shall be fabricated of steel meeting ASTM A307 and galvanized in conformance with ASTM A153.

Cable shall be a double galvanized 7 strand steel wire cable not less than 3/8" in diameter meeting ASTM A475.

Hinges shall be stainless steel, 4" wide x 2" deep x 1/8" thick with 4-3/16"Dia [#10-24] x 5/8" long slotted countersunk flat head stainless steel stove bolts/machine screws with stainless steel locking nuts to attach to the extruded panels. Centerline of the hinge pin shall be placed with offset letters so the sign will hang down vertically.



Detail A



Detail C

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911 SIGN SUPPORT INFORMATION AND SIGN DETAILS

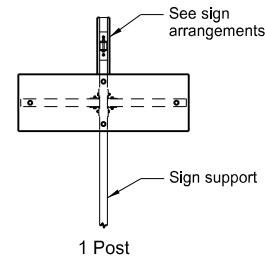
D-754-86

THE POST INFORMATION FOR VARIOUS SIGN CONFIGURATIONS (60 INCH VERTICAL CLEARANCE)													
ASSEMBLY NUMBER	STREET NAME SIGN SIZE	TOTAL SIGN AREA	MAXIMUM POST LENGTH	NUMBER OF POSTS	SUPPORT SIZE	SLEEVE LENGTH (A)			SLEEVE SIZE	ANCHOR			BREAK - AWAY
						1st LF	2nd LF	3rd LF		NUMBER	LENGTH LF	SIZE	
SA 1	24"x12"	8.00	20.2	1	2x2 12 ga					1 4.0	2.25x2.25 12ga		
	30"x12"	10.00	16.4	1	2x2 12 ga					1 4.0	2.25x2.25 12ga		
	36"x12"	12.00	13.8	1	2x2 12 ga					1 4.0	2.25x2.25 12ga		
	42"x12"	14.00	14.7	1	2x2 12 ga					1 4.0	2.25x2.25 12ga		
	48"x12"	16.00	12.9	1	2x2 12 ga					1 4.0	2.25x2.25 12ga		
	54"x12"	18.00	15.2	1	2.25x2.25 12 ga					1 4.0	2.5x2.5 12ga		
	60"x12"	20.00	13.7	1	2.25x2.25 12 ga					1 4.0	2.5x2.5 12ga		
	24"x9"	6.00	24.1	1	2x2 12 ga					1 4.0	2.25x2.25 12ga		
	30"x9"	7.50	21.2	1	2x2 12 ga					1 4.0	2.25x2.25 12ga		
	36"x9"	9.00	17.7	1	2x2 12 ga					1 4.0	2.25x2.25 12ga		
	42"x9"	10.50	15.3	1	2x2 12 ga					1 4.0	2.25x2.25 12ga		
	48"x9"	12.00	13.5	1	2x2 12 ga					1 4.0	2.25x2.25 12ga		
	54"x9"	13.50	14.8	1	2x2 12 ga					1 4.0	2.25x2.25 12ga		
	60"x9"	15.00	13.4	1	2x2 12 ga					1 4.0	2.25x2.25 12ga		
	24"x6"	4.00	35.2	1	2x2 12 ga					1 4.0	2.25x2.25 12ga		
	30"x6"	5.00	28.3	1	2x2 12 ga					1 4.0	2.25x2.25 12ga		
	36"x6"	6.00	23.6	1	2x2 12 ga					1 4.0	2.25x2.25 12ga		
	42"x6"	7.00	22.3	1	2x2 12 ga					1 4.0	2.25x2.25 12ga		
	48"x6"	8.00	19.6	1	2x2 12 ga					1 4.0	2.25x2.25 12ga		
	54"x6"	9.00	17.5	1	2x2 12 ga					1 4.0	2.25x2.25 12ga		
	60"x6"	10.00	15.4	1	2x2 12 ga					1 4.0	2.25x2.25 12ga		
SA 2	24"x12"	13.2	14.6	1	2.5x2.5 12 ga					1 4.0	3x3 7 ga		
	30"x12"	15.2	16.3	1	2.5x2.5 10 ga					1 4.0	3x3 7 ga	1	
	36"x12"	17.2	15.4	1	2.5x2.5 10 ga					1 4.0	3x3 7 ga	1	
	42"x12"	19.2	14.7	1	2.5x2.5 10 ga					1 4.0	3x3 7 ga	1	
	48"x12"	21.2	15.3	1	2.25x2.25 12 ga	4.5		2x2 12 ga		1 4.0	3x3 7 ga	1	
	54"x12"	23.2	20.6	1	2.5x2.5 10 ga	1.5		2.19x2.19 10ga		1 4.0	3x3 7 ga	1	
	60"x12"	25.2	16.7	1	2.5x2.5 12 ga	3.9		2.25x2.25 12ga		1 4.0	3x3 7 ga	1	
	24"x9"	11.2	15.2	1	2.5x2.5 12 ga					1 4.0	3x3 7 ga		
	30"x9"	12.7	14.5	1	2.5x2.5 12 ga					1 4.0	3x3 7 ga		
	36"x9"	14.2	16.5	1	2.5x2.5 10 ga					1 4.0	3x3 7 ga	1	
	42"x9"	15.7	15.8	1	2.5x2.5 10 ga					1 4.0	3x3 7 ga	1	
	48"x9"	17.2	14.4	1	2.5x2.5 10 ga					1 4.0	3x3 7 ga	1	
	54"x9"	18.7	15.1	1	2.25x2.25 12 ga	4.2		2x2 12ga		1 4.0	3x3 7 ga	1	
	60"x9"	20.2	14.6	1	2.25x2.25 12 ga	4.6		2x2 12 ga		1 4.0	3x3 7 ga	1	
	24"x6"	9.2	16.0	1	2.5x2.5 12 ga					1 4.0	3x3 7 ga		
	30"x6"	10.2	15.5	1	2.5x2.5 12 ga					1 4.0	3x3 7 ga		
	36"x6"	11.2	15.0	1	2.5x2.5 12 ga					1 4.0	3x3 7 ga		
	42"x6"	12.2	13.7	1	2.5x2.5 12 ga					1 4.0	3x3 7 ga		
	48"x6"	13.2	15.9	1	2.5x2.5 10 ga					1 4.0	3x3 7 ga	1	
	54"x6"	14.2	15.4	1	2.5x2.5 10 ga					1 4.0	3x3 7 ga	1	
	60"x6"	15.2	14.9	1	2.5x2.5 10 ga					1 4.0	3x3 7 ga	1	
SA 3	24"x12"	13.9	16.1	1	2.5x2.5 10 ga					1 4.0	3x3 7 ga	1	
	30"x12"	15.9	15.3	1	2.5x2.5 10 ga					1 4.0	3x3 7 ga	1	
	36"x12"	17.9	15.9	1	2.25x2.25 12 ga	4.4		2x2 12 ga		1 4.0	3x3 7 ga	1	
	42"x12"	19.9	15.2	1	2.25x2.25 12 ga	4.8		2x2 12 ga		1 4.0	3x3 7 ga	1	
	48"x12"	21.9	15.1	1	2.5x2.5 12 ga	5.1		2.25x2.25 12ga		1 4.0	3x3 7 ga	1	
	54"x12"	23.9	20.6	1	2.5x2.5 10 ga	1.9		2.19x2.19 10ga		1 4.0	3x3 7 ga	1	
	60"x12"	25.9	16.0	1	2.5x2.5 12 ga	4.7		2.25x2.25 12ga		1 4.0	3x3 7 ga	1	
	24"x9"	11.9	16.8	1	2.5x2.5 10 ga					1 4.0	3x3 7 ga	1	
	30"x9"	13.4	16.1	1	2.5x2.5 10 ga					1 4.0	3x3 7 ga	1	
	36"x9"	14.9	15.4	1	2.5x2.5 10 ga					1 4.0	3x3 7 ga	1	
	42"x9"	16.4	14.8	1	2.5x2.5 10 ga					1 4.0	3x3 7 ga	1	
	48"x9"	17.9	15.6	1	2.25x2.25 12 ga	4.3		2x2 12 ga		1 4.0	3x3 7 ga	1	
	54"x9"	19.4	14.9	1	2.5x2.5 12 ga	4.8		2.25x2.25 12ga		1 4.0	3x3 7 ga	1	
	60"x9"	20.9	20.6	1	2.5x2.5 10 ga	1.6		2.19x2.19 10ga		1 4.0	3x3 7 ga	1	
	24"x6"	9.9	14.7	1	2.5x2.5 12 ga					1 4.0	3x3 7 ga		
	30"x6"	10.9	14.3	1	2.5x2.5 12 ga					1 4.0	3x3 7 ga		
	36"x6"	11.9	16.5	1	2.5x2.5 10 ga					1 4.0	3x3 7 ga	1	
	42"x6"	12.9	16.0	1	2.5x2.5 10 ga					1 4.0	3x3 7 ga	1	
	48"x6"	13.9	14.8	1	2.5x2.5 10 ga					1 4.0	3x3 7 ga	1	
	54"x6"	14.9	14.4	1	2.5x2.5 10 ga					1 4.0	3x3 7 ga	1	
	60"x6"	15.9	15.3	1	2.25x2.25 12 ga	4.2		2x2 12 ga		1 4.0	3x3 7 ga	1	

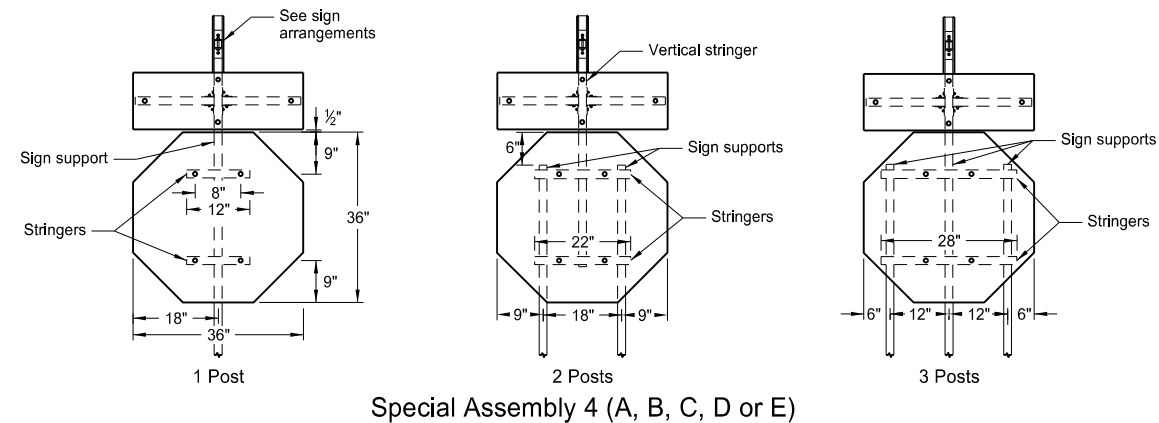
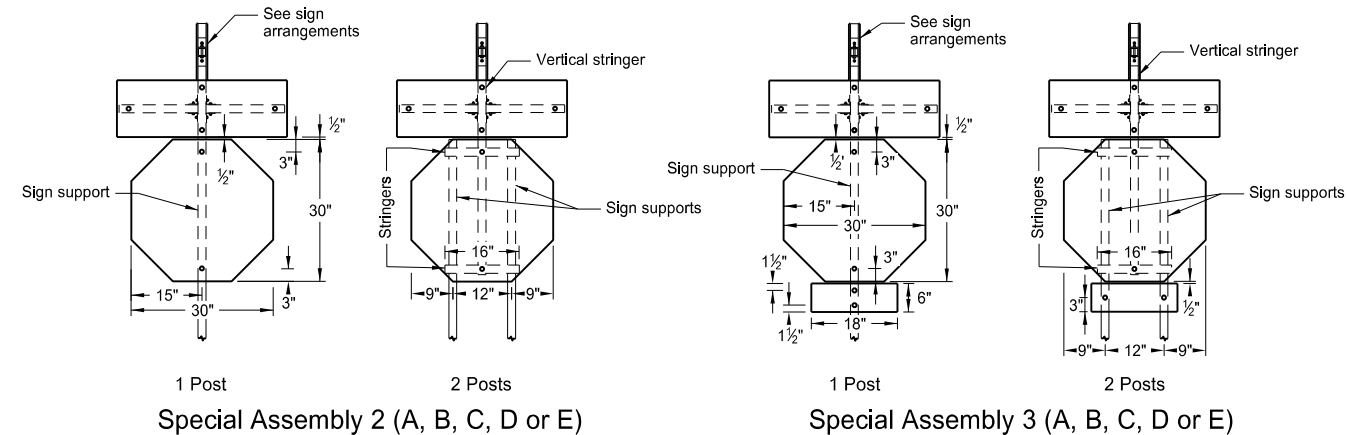
THE POST INFORMATION FOR VARIOUS SIGN CONFIGURATIONS (60 INCH VERTICAL CLEARANCE)													
ASSEMBLY NUMBER	STREET NAME SIGN SIZE	TOTAL SIGN AREA	MAXIMUM POST LENGTH	NUMBER OF POSTS	SUPPORT SIZE	SLEEVE LENGTH (A)			SLEEVE SIZE	ANCHOR			BREAK - AWAY
						1st	2nd	3rd		NUMBER	LENGTH	SIZE	
						LF	LF	LF					
SA 4	24"x12"	15.5	15.1	1	2.25x2.25 12 ga	4.7			2x2 12 ga	1 4.0	3x3 7 ga	1	
	30"x12"	17.5	15.1	1	2.5x2.5 12 ga	4.9			2.25x2.25 12 ga	1 4.0	3x3 7 ga	1	
	36"x12"	19.5	17.5	1	2.5x2.5 12 ga	3.6			2.25x2.25 12ga	1 4.0	3x3 7 ga	1	
	42"x12"	21.5	16.8	1	2.5x2.5 12 ga	4.1			2.25x2.25 12ga	1 4.0	3x3 7 ga	1	
	48"x12"	23.5	16.2	1	2.5x2.5 12 ga	4.5			2.25x2.25 12ga	1 4.0	3x3 7 ga	1	
	54"x12"	25.5	15.6	1	2.5x2.5 12 ga	4.9			2.25x2.25 12ga	1 4.0	3x3 7 ga	1	
	60"x12"	27.5	16.7	1	2.5x2.5 10 ga	4.2			2.19x2.19 10ga	1 4.0	3x3 7 ga	1	
	24"x9"	13.5	14.3	1	2.5x2.5 10 ga					1 4.0	3x3 7 ga	1	
	30"x9"	15.0	15.1	1	2.25x2.25 12 ga	4.4			2x2 12 ga	1 4.0	3x3 7 ga	1	
	36"x9"	16.5	14.6	1	2.25x2.25 12 ga	4.7			2x2 12 ga	1 4.0	3x3 7 ga	1	
	42"x9"	18.0	14.7	1	2.5x2.5 12 ga	4.9			2.25x2.25 12 ga	1 4.0	3x3 7 ga	1	
	48"x9"	19.5	17.2	1	2.5x2.5 12 ga	3.5			2.25x2.25 12ga	1 4.0	3x3 7 ga	1	
	54"x9"	21.0	15.8	1	2.5x2.5 12 ga	4.3			2.25x2.25 12ga	1 4.0	3x3 7 ga	1	
	60"x9"	22.5	15.4	1	2.5x2.5 12 ga	4.6			2.25x2.25 12ga	1 4.0	3x3 7 ga	1	
	24"x6"	11.5	14.7	1	2.5x2.5 10 ga					1 4.0	3x3 7 ga	1	
	30"x6"	12.5	14.4	1	2.5x2.5 10 ga					1 4.0	3x3 7 ga	1	
	36"x6"	13.5	14.0	1	2.5x2.5 10 ga					1 4.0	3x3 7 ga	1	
	42"x6"	14.5	15.0	1	2.25x2.25 12 ga	4.2			2x2 12 ga	1 4.0	3x3 7 ga	1	
	48"x6"	15.5	14.5	1	2.5x2.5 12 ga	4.6			2.25x2.25 12 ga	1 4.0	3x3 7 ga	1	
	54"x6"	16.5	14.1	1	2.5x2.5 12 ga	4.9			2.25x2.25 12ga	1 4.0	3x3 7 ga	1	
	60"x6"	17.5	16.8	1	2.5x2.5 12 ga	3.5			2.25x2.25 12ga	1 4.0	3x3 7 ga	1	
SA 5	24"x12"	21.3	17.2	2	2.5x2.5 10 ga					2 4.0	3x3 7 ga	2	
	30"x12"	23.3	16.7	2	2.5x2.5 10 ga					2 4.0	3x3 7 ga	2	
	36"x12"	25.3	16.3	2	2.5x2.5 10 ga					2 4.0	3x3 7 ga	2	
	42"x12"	27.3	17.3	2	2.25x2.25 12 ga	4.2	4.6		2x2 12ga	2 4.0	3x3 7 ga	2	
	48"x12"	29.3	16.9	2	2.25x2.25 12 ga	4.5	5.0		2x2 12 ga	2 4.0	3x3 7 ga	2	
	54"x12"	31.3	16.5	2	2.25x2.25 12 ga	4.7	5.3		2x2 12 ga	2 4.0	3x3 7 ga	2	
	60"x12"	33.3	17.5	3	2.5x2.5 12 ga					3 4.0	3x3 7 ga	3	
	24"x9"	19.3	15.6	1	2.5x2.5 10 ga	4.9			2.19x2.19 10ga	1 4.0	3x3 7 ga	1	
	30"x9"	20.8	17.0	2	2.5x2.5 10 ga					2 4.0	3x3 7 ga	2	
	36"x9"	22.3	16.7	2	2.5x2.5 10 ga					2 4.0	3x3 7 ga	2	
	42"x9"	23.8	16.3	2	2.5x2.5 10 ga					2 4.0	3x3 7 ga	2	
	48"x9"	25.3	16.0	2	2.5x2.5 10 ga					2 4.0	3x3 7 ga	2	
	54"x9"	26.8	17.2	2	2.25x2.25 12 ga	3.9	4.5		2x2 12 ga	2 4.0	3x3 7 ga	2	
	60"x9"	28.3	16.8	2	2.25x2.25 12 ga	4.2	4.8		2x2 12 ga	2 4.0	3x3 7 ga	2	
	24"x6"	17.3	15.8	1	2.5x2.5 10 ga	4.4			2.19x2.19 10ga	1 4.0	3x3 7 ga	1	
30"x6"	18.3	15.5	1	2.5x2.5 10 ga	4.5			2.19x2.19 10ga	1 4.0	3x3 7 ga	1		
36"x6"	19.3	15.3	1	2.5x2.5 10 ga	4.7			2.19x2.19 10ga	1 4.0	3x3 7 ga	1		
42"x6"	20.3	15.1	1	2.5x2.5 10 ga	4.9			2.19x2.19 10ga	1 4.0	3x3 7 ga	1		
48"x6"	21.3	16.7	2	2.5x2.5 10 ga					2 4.0	3x3 7 ga	2		
54"x6"	22.3	16.4	2	2.5x2.5 10 ga					2 4.0	3x3 7 ga	2		
60"x6"	23.3	16.8	2	2.25x2.25 12 ga	3.8	4.4		2x2 12 ga	2 4.0	3x3 7 ga	2		

SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS FOR STREET NAME SIGNS AND 911 SIGNS

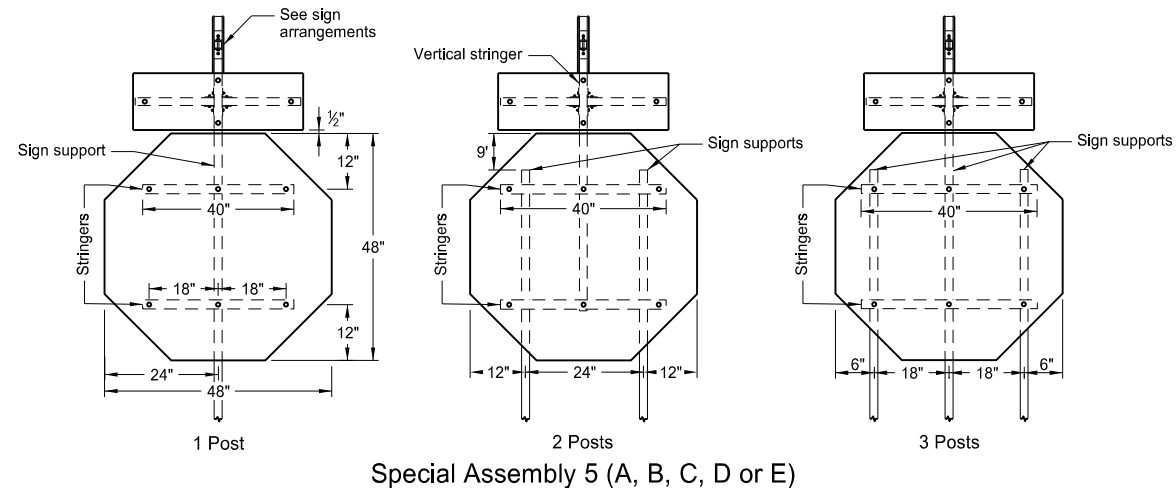
- A - Single sign
- B - Single sign back to back
- C - Single sign each direction
- D - Single sign one direction,
back to back other direction
- E - Back to back both directions



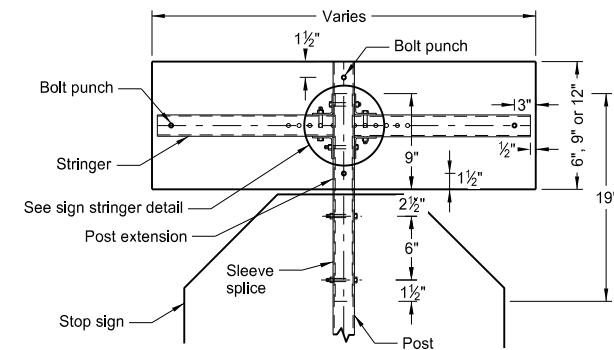
Special Assembly 1 (A, B, C, D or E)



Special Assembly 4 (A, B, C, D or E)

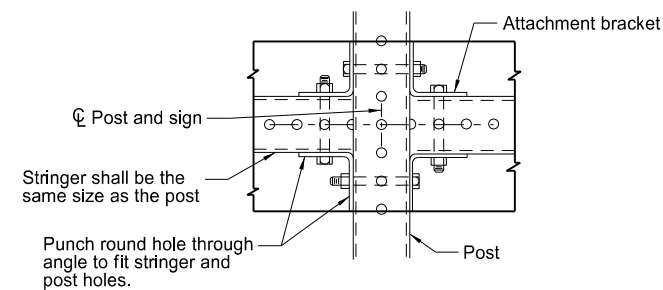


Special Assembly 5 (A, B, C, D or E)

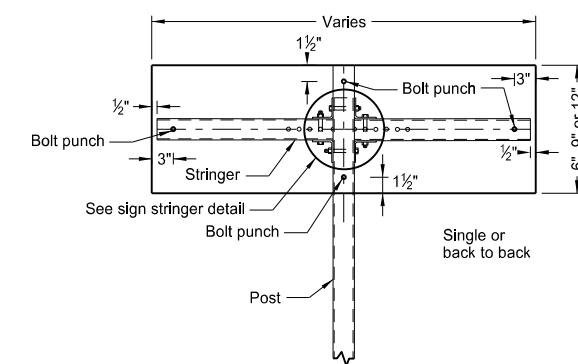


Front View
Sleeve Splice Detail

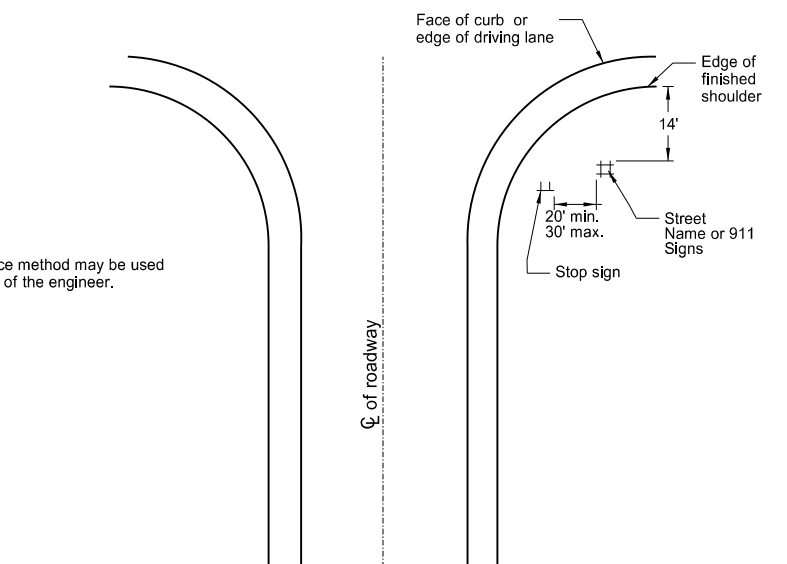
Note: The splice method may be used upon approval of the engineer.



Sign Stringer Detail

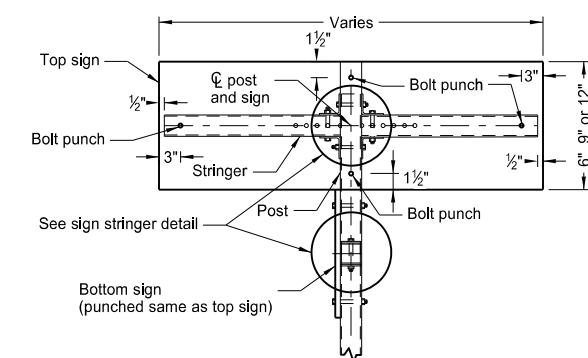


Detail A or B



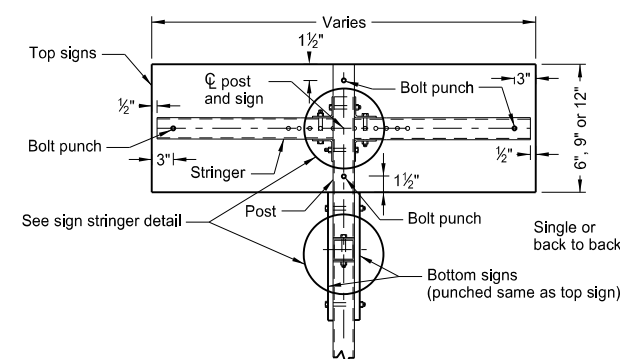
Intersection Layout

Note: This layout is to be used for street name signs or 911 signs that are used with Special Assembly 1.



Detail C

Sign Arrangements

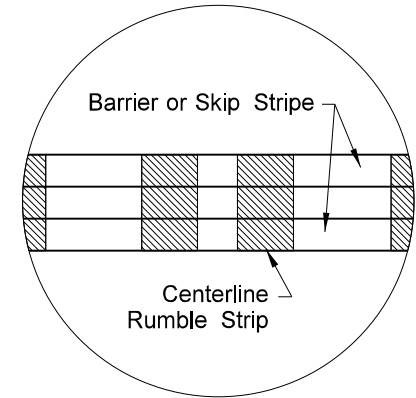
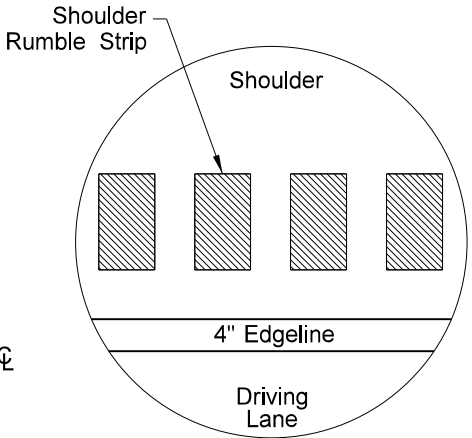
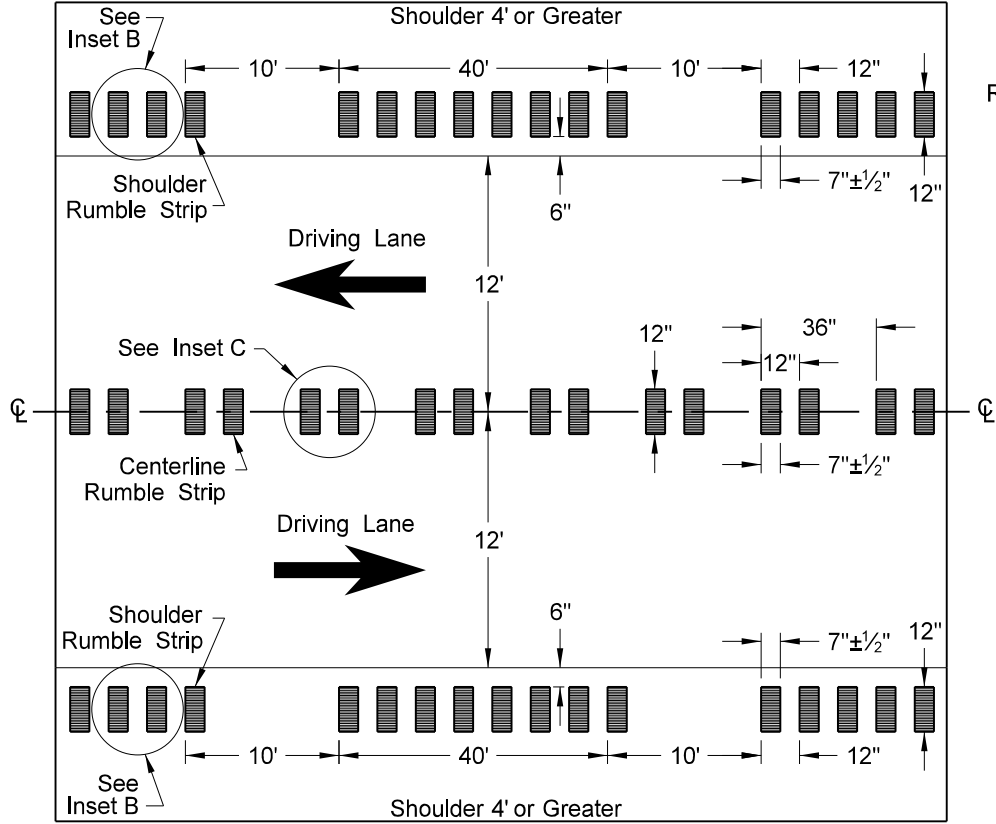


Detail D or E

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE

This document was originally
issued and sealed by
Roger Weigel
Registration Number
PE- 2930 ,
on 10/3/13 and the original
document is stored at the
North Dakota Department
of Transportation

RUMBLE STRIPS
UNDIVIDED HIGHWAYS (SHOULDERS 4' OR GREATER)



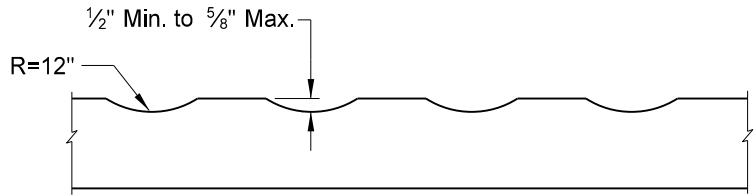
Inset B - Shoulder Rumble Strip

Inset C - Centerline Rumble Strip

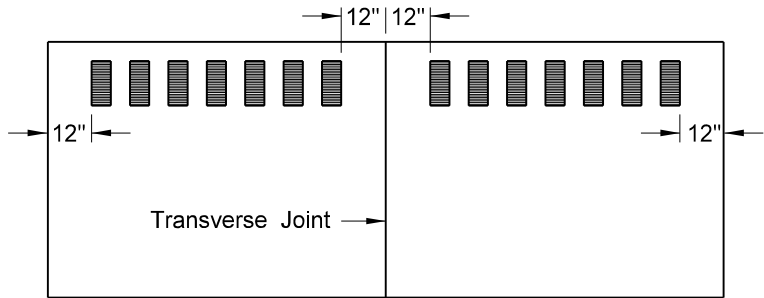
NOTES:

- 1) Discontinue shoulder rumble strips through the entire length of right turn lanes, 100' before right turn lane tapers, and at the radius of a paved or gravel highway, section line, approach, or private drive.
- 2) Discontinue centerline rumble strips through the entire length of left turn lanes, 100' before left turn lane tapers and median islands, and 100' before and after a paved or gravel highway, section line, approach, or private drive.

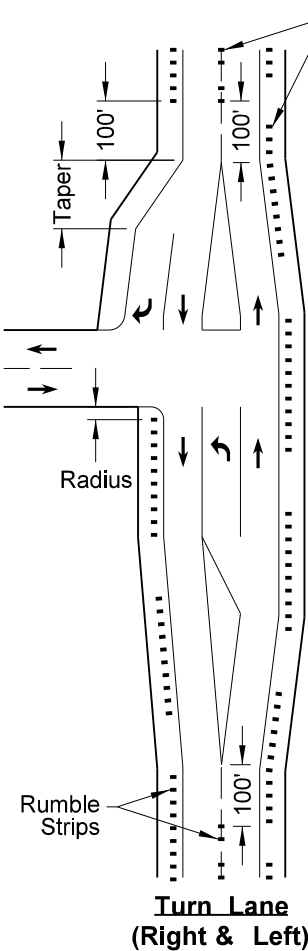
Undivided Highways (Shoulders 4' or Greater)



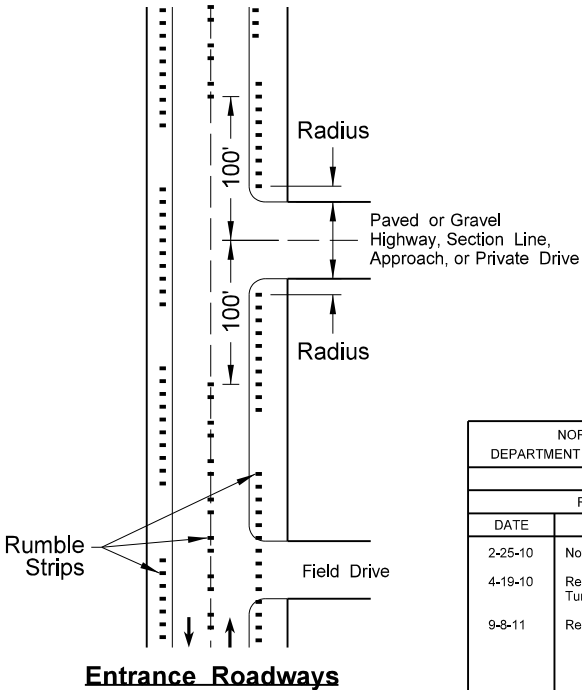
Profile of Rumble Strips - Bituminous and PCC Pavements



Discontinue rumble strip approx. 12" on both sides of PCC transverse joint



**Turn Lane
(Right & Left)**



Entrance Roadways

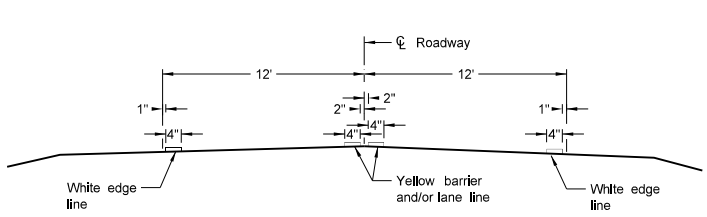
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-29-09	
REVISIONS	
DATE	CHANGE
2-25-10	Note 4 was added.
4-19-10	Revised Note 5, Note 6, and Turn Lane (Right & Left).
9-8-11	Revised Notes and D-760-3.

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 9/8/11 and the original document is stored at the North Dakota Department of Transportation

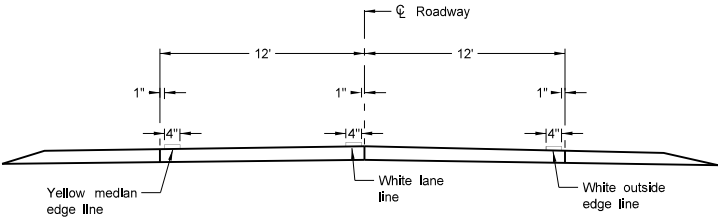
PAVEMENT MARKING

D-762-4

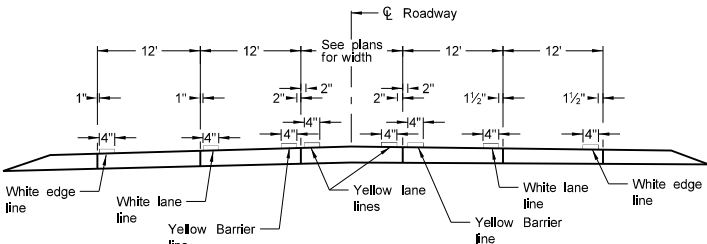
- NOTES:
- 1. Edge lines shall be continued through private drives and field drives and broken for intersections.



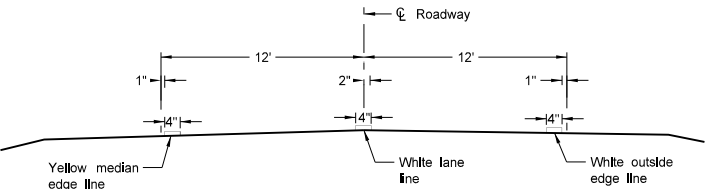
Two Lane Two Way
RURAL ROADWAY



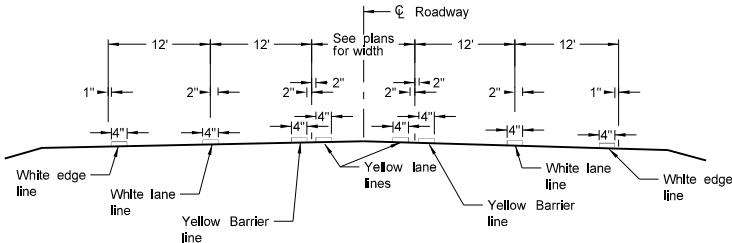
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



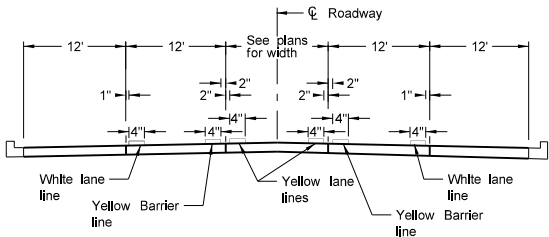
RURAL FIVE LANE ROADWAY
Concrete Section



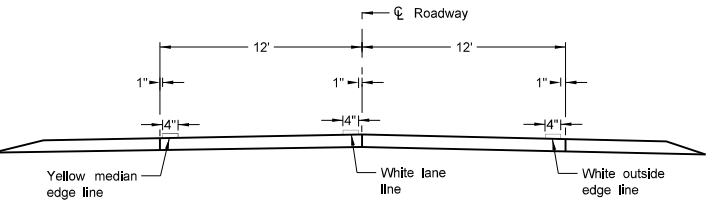
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



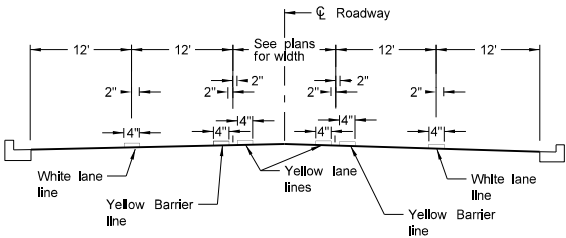
RURAL FIVE LANE ROADWAY
Asphalt Section



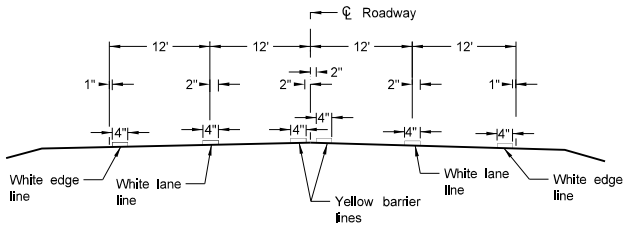
URBAN FIVE LANE SECTION
Concrete Section



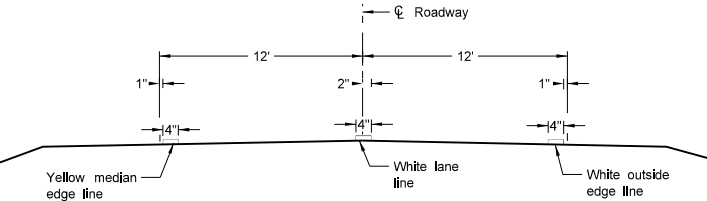
Two Lane Roadway
PRIMARY HIGHWAY
Concrete Section



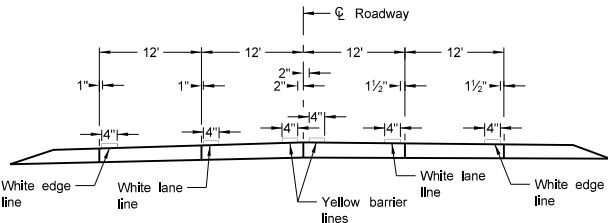
URBAN FIVE LANE SECTION
Asphalt Section



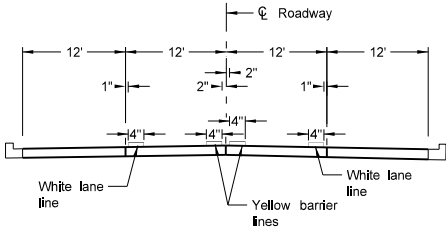
RURAL FOUR LANE ROADWAY
Asphalt Section



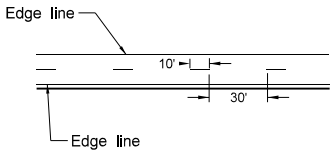
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Concrete Section



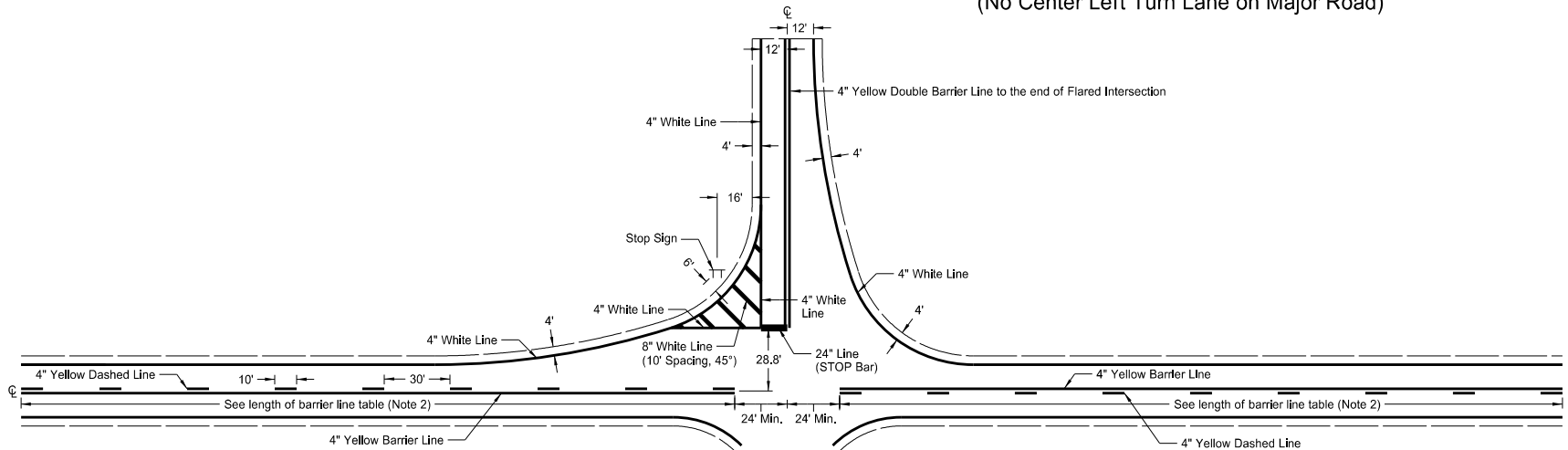
CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE

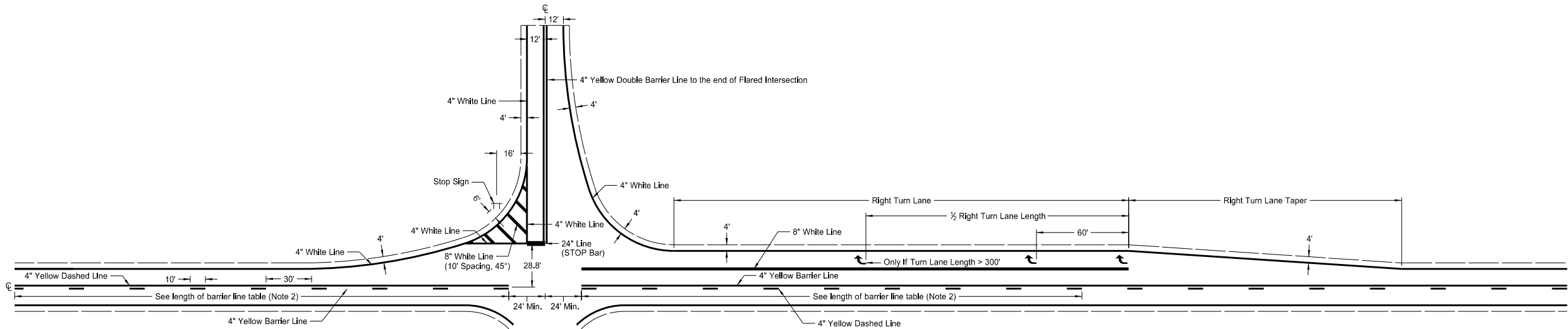
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PAVEMENT MARKING FOR STANDARD 90 DEGREE FLARED INTERSECTION
(No Center Left Turn Lane on Major Road)

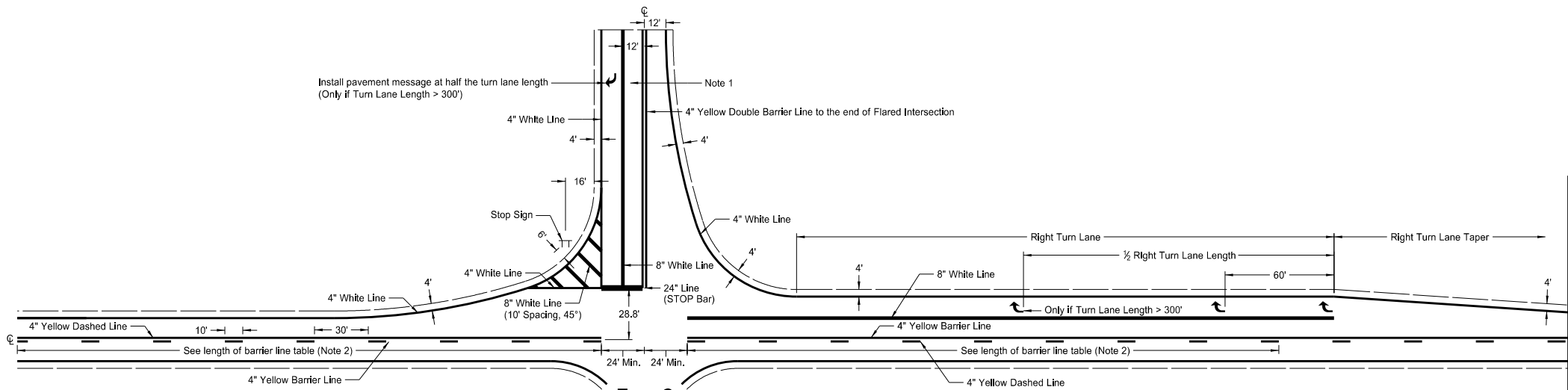
D-762-5



Type A
(No turn lanes present)



Type B
(Right Turn Lane on Major Road)



Type C
(Right Turn Lane on Major Road, and Turn Lane on Minor Road)

Notes

1. At "T" intersections (3-leg), additionally install left turn pavement marking message arrow.
2. The barrier lines have variable distances dependent on the speed limit. The length for the barrier lines shall be obtained from the table below, which is stopping sight distance.

Table for Length of Barrier Line									
Speed Limit (mph)	30	35	40	45	50	55	60	65	70
Minimum Length	200'	250'	305'	360'	425'	495'	570'	645'	730'

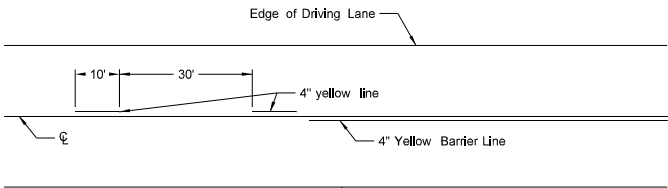
- 4" Marking
- 8" Marking
- 24" Marking

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
3-29-16	
REVISIONS	
DATE	CHANGE

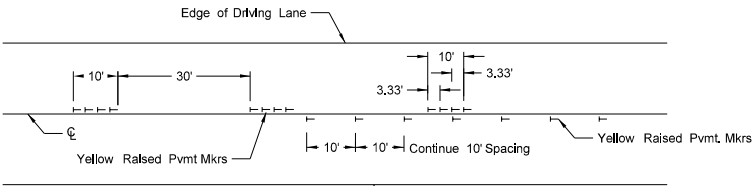
This document was originally issued and sealed by Roger Weigel Registration Number PE- 2930, on 03/29/16 and the original document is stored at the North Dakota Department of Transportation

SHORT-TERM PAVEMENT MARKING

D-762-11

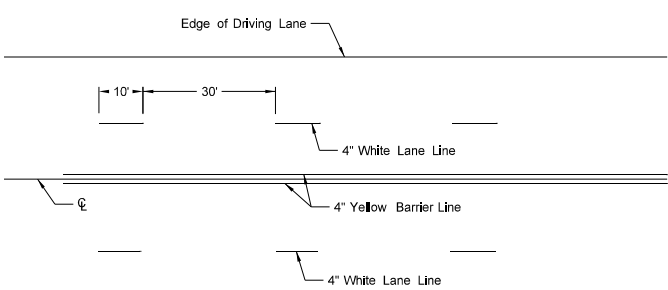


Painted or Tape Lines

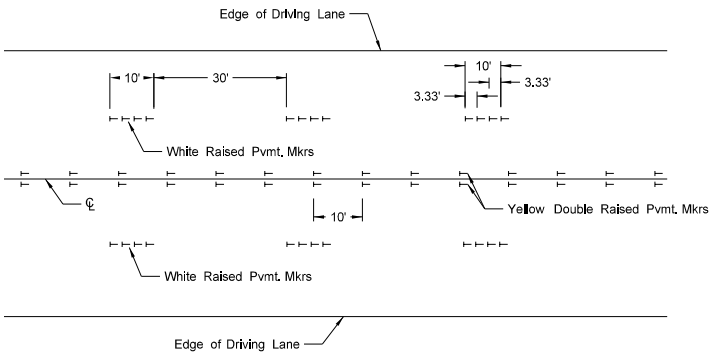


Raised Pavement Markers

TWO-LANE TWO-WAY ROADWAY

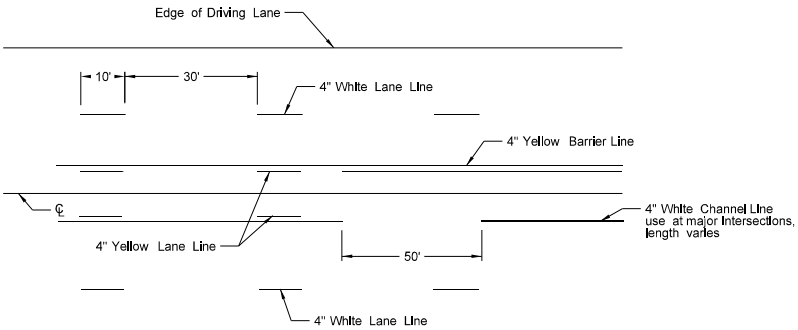


Painted or Tape Lines

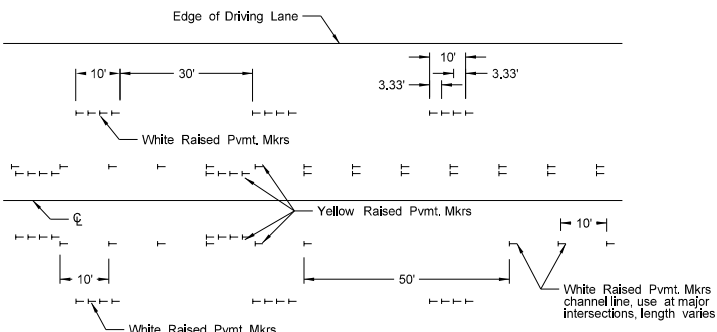


Raised Pavement Markers

FOUR LANE ROADWAY

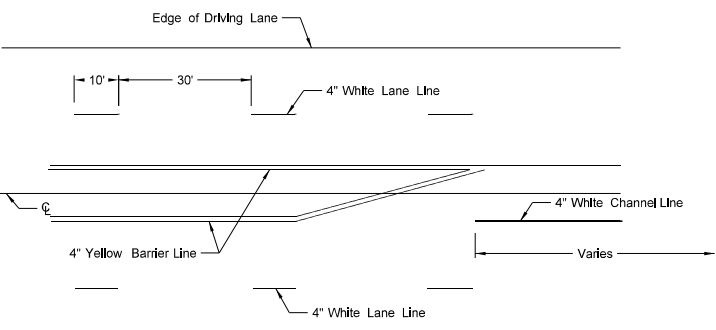


Painted or Tape Lines

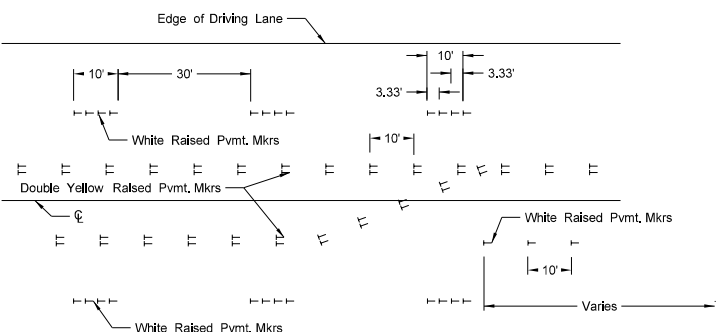


Raised Pavement Markers

FIVE LANE ROADWAY TWO WAY LEFT TURN



Painted or Tape Lines



Raised Pavement Markers

FIVE LANE ROADWAY WITH MARKED ISLANDS

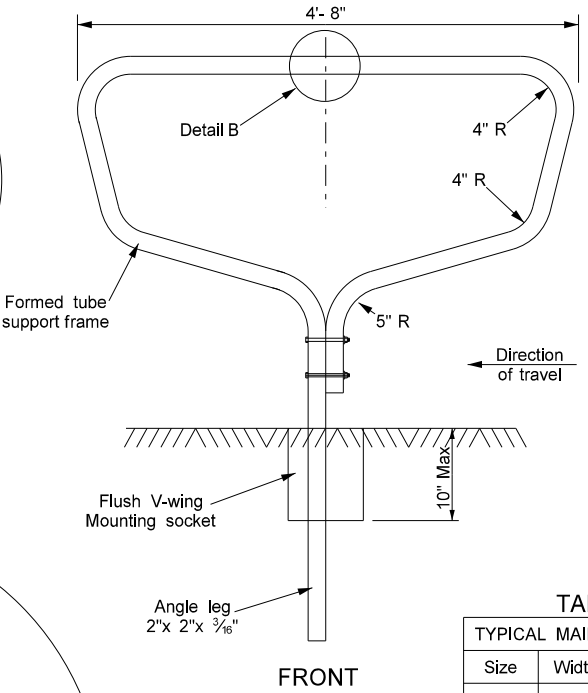
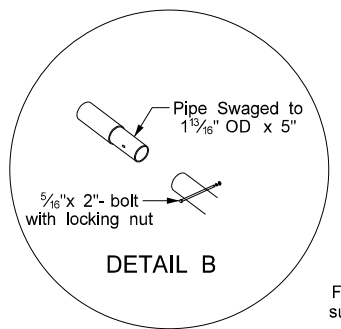
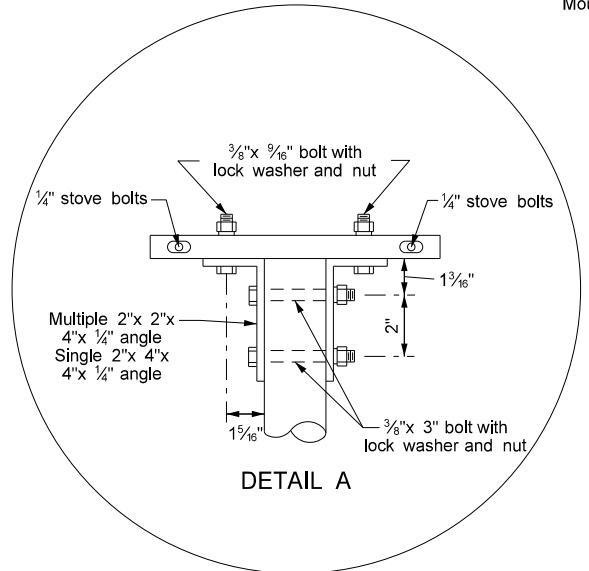
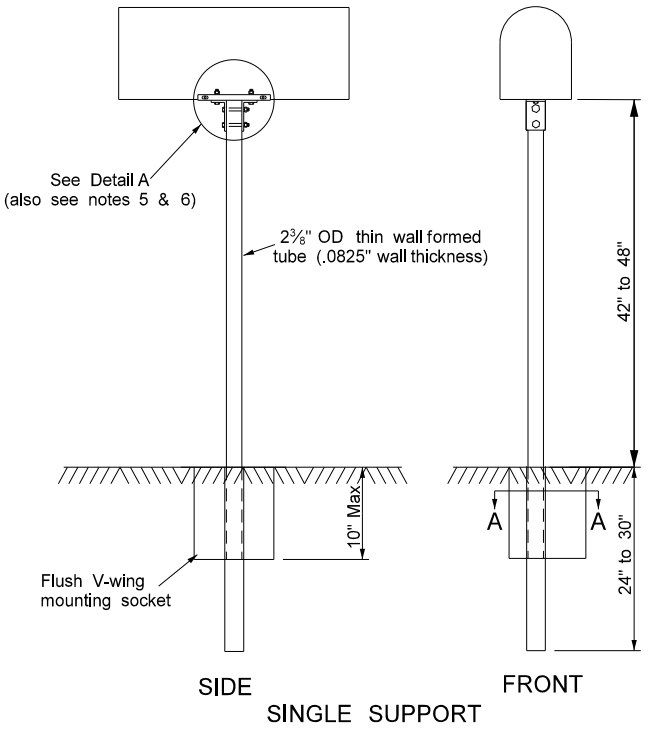
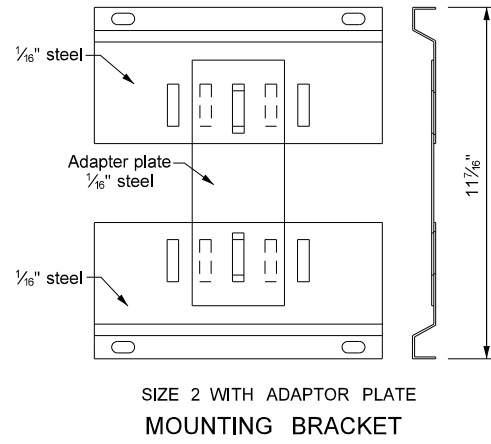
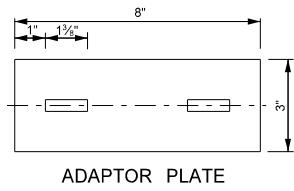
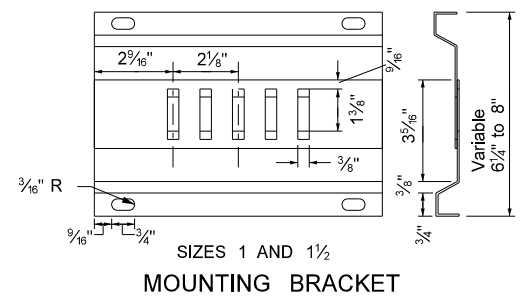
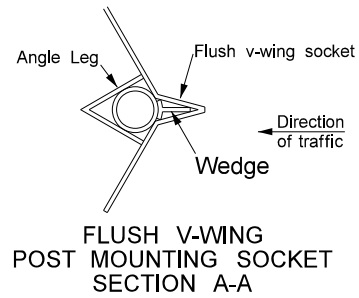
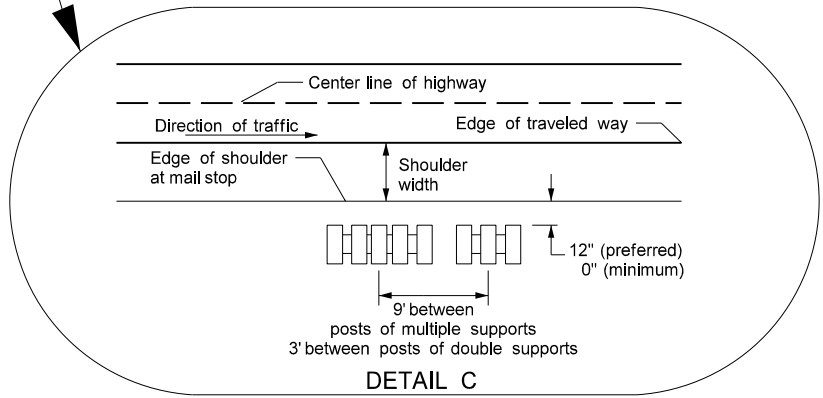
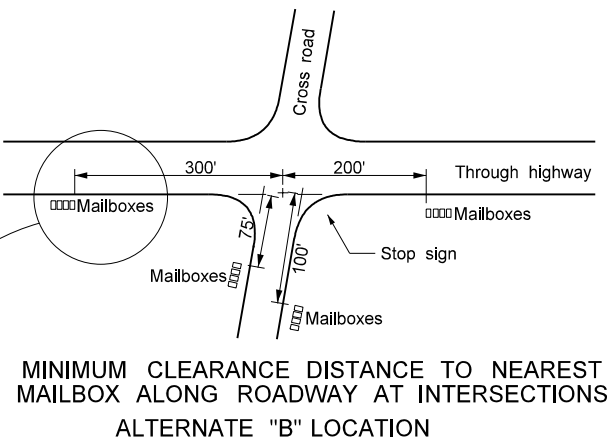
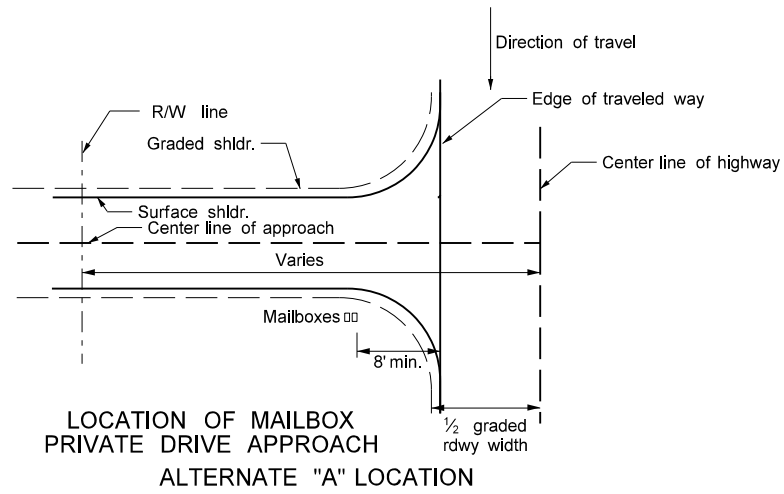
- NOTES:
- Two-lane two-way roadways shall have no passing zones placed as shown. No passing zone signs may be placed in lieu of short term no passing zone pavement markings. These signs will be allowed to remain in place for three days, at which time the short term no passing zone pavement marking shall be placed.
 - Short term center line stripe (paint) on top lift shall be carefully placed with exact spacing so that the permanent stripe will match when applied.
 - Raised markers and tape markings shall be removed after permanent pavement marking has been installed. Removed markings shall become the property of the contractor.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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MAILBOX LOCATION DETAILS

D-766-1



- Notes:
- The mailbox support and hardware details shall consist of the "V-Loc Mailbox Support System" manufactured by:

Tapco
Traffic & Parking Control Co. Inc.
 - Any other equal support system meeting the requirements of NCHRP Report 350, which has been crash tested, and approved by the Federal Highway Administration may be used. Approved alternate mailbox assemblies shall be installed in the manner and arrangement crash tested.
 - The preferred location for all mailboxes is the Alternate "A" location. However, the Engineer may approve the Alternate "B" location if warranted by existing field conditions.
 - Postal regulations require that mailboxes must be located on the right-hand side of the road in the direction traveled by the carrier. Therefore, the Engineer shall contact the local carrier or postmaster before installing new mailboxes to verify the direction of travel.
 - Mailboxes installed on private drive approaches must always be located on the downstream side of the approach.
 - Install angle connection parallel to traffic flow for size 2 mailbox mounted on single posts.
 - Size 2 mailbox mounted on multiple support requires 2 each, 3/8" by 9/16" bolts with lock washers and nuts to attach the adapter plate to mounting bracket. The unit will then require 4 angle connections to attach to the formed tube support frame. See Detail A.
 - Space multiple support frames a minimum of 4 feet apart. Space single support frames a minimum of 3 ft apart. Do not place more than five No. 1 mailboxes, three No. 2 mailboxes, or any combination of four No. 1-A and No. 2 mailboxes on multiple support frames.

TABLE A
TYPICAL MAILBOX DIMENSIONS

Size	Width	Height	Length
1	6.5"	8.5"	19"
1A	8"	10.5"	21"
2	11.5"	13.5"	23.5"

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